



LETTER OF TRANSMITTAL

TO: HCDEH
100 H St., Suite 100
Eureka, CA 95501

ATTN: MARK VERHEY

DATE: May 4, 2005
JOB NO.: 4563.01
PROJECT: LOP No. 12672

TRANSMITTED BY: Mail Delivered In Person Fax

No. Copies	Description	
1	1. Remedial Action Plan Addendum; Final System Design and Updated	
	2. Site Conceptual Model	LMO
	3.	DRG
	4.	DNL
	5.	GH
	6.	GEO
		HPI
		DSB
		VTS
		CJW

REMARKS:

File _____
Project# _____

THIS MATERIAL SENT FOR: As Requested Information
 Approval

cc: Mr. Jim Seiler; HPI
(electronically sent)

By: V.T. Sullivan

Vincent T. Sullivan

REMEDIAL ACTION PLAN ADDENDUM FINAL SYSTEM DESIGN AND UPDATED SITE CONCEPTUAL MODEL

Fortuna Gas-4-Less
819 Main Street, Fortuna, California

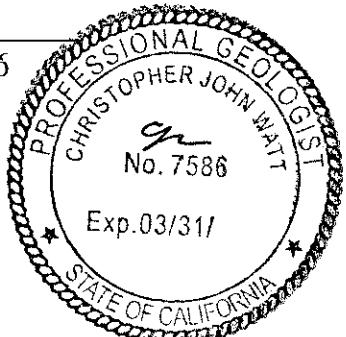
LOP No. 12672

Prepared for:
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May 4, 2005
Project No. 4563.01

REMEDIAL ACTION PLAN ADDENDUM

FINAL SYSTEM DESIGN AND UPDATED SITE CONCEPTUAL MODEL

Humboldt Petroleum, Inc.; Fortuna Gas-4-Less, 819 Main Street, Fortuna, California

LOP No. 12672; LACO ASSOCIATES Project No. 4563.01

EXECUTIVE SUMMARY

The subject property is located on the southeast corner of the intersection of Main and Eighth Streets in Fortuna, California (Figure 1). A site map is presented as Figure 2. The current owner and responsible party is Humboldt Petroleum, Inc. (HPI). LACO ASSOCIATES (LACO) was retained by the property owner as an engineering consultant to perform professional services required by the Humboldt County Division of Environmental Health (HCDEH). LACO submitted a *Remedial Action Plan* (RAP) in February 2003 which recommended a 6-month pilot test to determine the final remediation design, and results of the pilot test were submitted in November 2004. This RAP Addendum presents a final remedial treatment system design based on the data from the pilot test, and includes an updated site conceptual model that incorporates the neighboring Fortuna Chevron site.

INTRODUCTION

The following RAP Addendum details our proposed scope of work to install, operate, and monitor an oxygen sparge system to reduce the mass of total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), total petroleum hydrocarbons as motor oil (TPHmo), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and fuel oxygenate secondary sources on-site. Radius of influence, flow rate, and nutrient demand data from the pilot test was used to design a final remediation system. The natural attenuation of the off-site fuel oxygenate plume will be monitored as part of the remedial action plan.

SCOPE OF WORK

The following scope of work details LACO's plan to install, operate, and monitor an oxygen sparging treatment system at the subject site (Figure 2).

A. Background

1. *Hydrogeology*

Stratigraphic data from the subject site and neighboring Chevron site was combined to form a composite cross-section. The cross-section lines are shown on Figure 2. The stratigraphic cross-section with dissolved benzene and methyl tertiary butyl ether (MTBE) isoconcentration contours are included as Figures 3 and 4, respectively. The

following discussion is an updated site conceptual model based on an interpretation of strata observed on and around the site, contaminant distribution and materials analysis of select stratigraphic units.

Stratigraphic data from boring and well installations indicated several primarily sand and gravel water-bearing units separated by layers of primarily dense clayey silt to a depth of approximately 40 feet below ground surface (bgs). Previous investigations have indicated the upper contact of the dense well-graded gravel of the Rohnerville formation occurs at 38 to 45 feet below the site. The Rohnerville formation functions as a confined artesian water-bearing unit in the vicinity of the subject property.

a. *Perched Water-Bearing Unit*

The perched water-bearing unit at the site is a well-graded to silty gravel with an estimated hydraulic conductivity of 10^{-2} cm/s. The perched water-bearing unit dips generally to the south, is 3 to 5 feet thick, and occurs between 5 to 12 feet bgs at the site. It does not appear to extend west under Eighth Street, or east under the neighboring Chevron site. The screened intervals of monitoring wells MW1 through MW5 and MW16 through MW18 are within the perched water-bearing unit. Groundwater flow appears to be to the southwest.

b. *Confining Layer*

The stratigraphic unit separating the perched and shallow water-bearing units is 3- to 4-foot thick laterally continuous dense clayey silt with an estimated hydraulic conductivity of 10^{-10} cm/s. The confining layer appears to taper off beneath the on-site canopy and does not extend east to the neighboring Chevron site.

c. *Shallow Water-Bearing Unit*

The shallow water-bearing unit at the site is a well-graded to clayey silty sand with an estimated hydraulic conductivity of 10^{-3} to 10^{-5} cm/s. The shallow water-bearing unit dips generally to the south, is 7 to 9 feet thick, and occurs between 11 to 22 feet bgs at the site and between 17 feet bgs and an unknown depth at "L" Street, south of the site. The screened intervals of monitoring wells MW6 through MW13 and MW15 are within the shallow water-bearing unit. Groundwater flow appears to be to the southwest.

d. Confining Layer

The stratigraphic unit separating the shallow and intermediate water-bearing units is a 4- to 5-foot thick dense clayey silt occurring between 18 and 25 feet bgs with an estimated hydraulic conductivity of 10^{-10} centimeters per second. This layer is present beneath the Chevron site and neighboring hotel, but does not appear in the alleyway west of Eight Street. No other borings were completed to the depth of this layer on-site; therefore, the lateral extent of this unit is unknown.

e. Intermediate Water-Bearing Unit

The intermediate water-bearing unit at the site is a well-graded to silty sand with an estimated hydraulic conductivity of 10^{-3} to 10^{-5} cm/s. At the site, the intermediate water-bearing unit occurs from 25 to 35 feet bgs. Monitoring wells associated with the Chevron site are screened within the intermediate water-bearing unit, as are the recently installed monitoring wells MW17S and MW17D. Recent investigation indicates the confining layer separating the shallow and intermediate water-bearing units does not appear in the alleyway west of Eighth Street. It appears that the shallow and intermediate water-bearing units may be hydraulically connected at a point west of the site.

f. Confining Layer

The stratigraphic unit separating the intermediate and deep water-bearing units is a 2- to 3-foot thick dense clayey silt with an estimated hydraulic conductivity of 10^{-10} cm/s. No borings were completed to the depth of this layer on-site; therefore, the lateral extent of this unit is unknown.

g. Deep Water-Bearing Unit

The deep water-bearing unit at the site is well-graded gravel and sand with an estimated hydraulic conductivity of 1 to 10 cm/s. The upper contact of the deep water-bearing unit occurs from 38 to 45 feet bgs and extends to an unknown depth.

2. Hydrocarbons

The primary contaminants of concern (COCs) at the site are gasoline, diesel, and motor oil range material, MTBE, tertiary amyl methyl ether (TAME), and tertiary butyl alcohol (TBA). Sorbed-phase TPHg, TPHd, TPHmo, and BTEX have been identified as secondary sources. Dissolved phase MTBE trapped in the interstitial pore spaces have

been identified as a secondary source. Additionally, small pockets of non-aqueous phase liquid (NAPL) have been suggested by the ethylbenzene to xylenes ratio observed at the site. Figure 5 presents the extent of sorbed-phase TPH. Historical soil and groundwater analytical results from subsurface investigation activities are included as Tables 1 and 2, respectively. Historic groundwater analytical results from quarterly monitoring events are presented as Table 3.

Dissolved-phase TPHg, BTEX, and fuel oxygenates have been identified in the perched, shallow, and intermediate water-bearing units at the site. TPHg concentrations within the core of the dissolved-phase plume are approximately 10,000 µg/L. BTEX and fuel oxygenate dissolved-phase concentrations are approximately 1,000 µg/L.

B. Remedial System

1. *Description*

The proposed treatment is an oxygen sparging system comprising a master panel and a distribution network. The master panel installed for the pilot test will be replaced with a larger panel to accommodate additional supply lines. A front view of the panel's enclosure and power meter are shown on Figure 6. The master panel is currently comprised of an oxygen distiller, positive displacement pump, control system, cooling system, outflow one-way check valves for two supply lines, and a high temperature shutdown switch. The distribution network from the master panel to each sparge well comprises double-contained $\frac{3}{8}$ -inch diameter tubing, a one-way check valve, $\frac{3}{4}$ -inch diameter PVC riser, and 2-inch diameter KVA sparge point. The supply system automatically cycles flow to one sparge well at a time for a specified duration. The full scale distribution network will include an array of nine sparge points installed in nine wells. The sparge wells will be installed within the shallow water-bearing unit to 22 feet bgs. A single-point sparge well detail is included as Figure 7.

2. *Theory*

Through the aerobic degradation process, native microbes metabolize organic compounds to carbon dioxide, water, and biomass in the presence of sufficient bio-available nutrients and dissolved oxygen. The addition of micron-sized bubbles of oxygen to the saturated secondary source will increase the mass transfer of oxygen from gas to dissolved-phase and therefore convert the degradation process from anaerobic to aerobic.

3. Remedial Model

The following discussion outlines the remedial process of the oxygen sparging system. At the treatment zone, sorbed-phase TPH (gasoline, diesel and motor oil) was estimated to have a mass of approximately 1,000 kilograms (kg). During the pilot test, 3,599 kg and 645 kg of oxygen was injected into the shallow and perched water-bearing units, respectively, for a total of 4,244 kg of oxygen injection. It is estimated that 197 kg of sorbed phase TPHg was located within the shallow and perched treatment zones prior to system start-up. Pre- and post-pilot test TPHg concentrations in monitoring wells MW4 and MW6 were used to estimate the amount of sorbed TPHg mass destroyed during the test. Tables A and B, included below, summarize LACO's pilot test efficiency calculations.

Table A: Initial/Final TPHg Concentration Ratio Calculation, Using Pilot Test Performance Data

Monitoring Well	Initial TPHg Concentration (3/4/04) ($\mu\text{g/L}$)	Final TPHg Concentration (8/24/04) ($\mu\text{g/L}$)	Ratio (Initial/Final)
MW4	7,600	720	10.6
MW6	710	50	14.2

Table B: Estimated Remaining Sorbed-Phase Mass, Using Initial/Final TPHg Concentration Ratio

Initial TPHg Mass (kg)	Ratio (Initial/Final)	Reduction in TPHg Mass (kg)	Remaining TPHg Mass (kg)
197	10.6	178.3	18.7
	14.2	183.1	13.9

Using the data generated during the pilot test, LACO estimates approximately 23 to 24 kg of oxygen was injected for every 1 kg of petroleum hydrocarbon contamination destroyed, resulting in a 24 kg H₂O : kg TPH ratio. LACO's estimated time for a 100 percent reduction in TPH mass is presented in Table C, included below.

Table C: Estimated Time for 100% TPH Mass Reduction, Assuming Oxygen Output Rate of 870 g/hour		
Estimated TPH Mass Remaining after Pilot Test (kg)	Total Oxygen Injection, using 24 kg O ₂ : kg TPH ratio (kg)	Number of years for 100% TPH Mass Reduction
803	19,272	2.53

4. By-Products

Potential by-products of aerobic respiration of gasoline and diesel range compounds include organic carbon, water, and carbon dioxide. These constituents will be included in the initial monitoring program described below in the *Proposed Monitoring* section.

5. Treatment-Array and Operational Model

The treatment zone is defined as the area within the radius of influence of the oxygen sparge wells. Sorbed-phase COC's will be destroyed using oxygen as an enhanced bioremediation electron acceptor.

6. Master Panel Installation

The master panel will be installed adjacent to the treatment-array along the outside wall of the restroom building. An air compressor will be connected to the sparge well network with an oxygen concentrator feeding the compressor. The equipment will be placed in a NEMA 4,12-rated enclosure secured to the building wall. The oxygen concentrator produces a maximum of approximately 21 kgs of oxygen per day and will run continuously. A pressure gauge and flow meter allow monitoring of the system operation. A fan and vents will be installed in the cabinet to ensure heat dissipation and adequate air circulation for the equipment.

7. Distribution Network Installation

The distribution lines ($\frac{1}{4}$ -inch ID, $\frac{3}{8}$ -inch OD) will comprise double contained tubing and will be directly buried on 3 inches of $\frac{3}{8}$ -inch gravel as fill, overlain by 3 inches of sand slurry and 3 inches of concrete in a 1-foot by 1-foot trench. The trench system will convey the double-contained tubing from each individual sparge well head to the control box, where each supply tube is connected to an oxygen generator. A trench detail is included as Figure 8.

8. Sparge Well Installation and Construction

The sparge wells will be installed using a direct-push drilling rig fitted with 3.25-inch outside diameter (OD) dual tube rods. Proposed sparge well locations are presented on Figure 9. A 10-inch fine pore diffuser will be attached to $\frac{1}{2}$ -inch diameter Schedule 40 PVC pipe. The shallow wells will be set at a depth of up to 20 feet bgs, and the perched wells will be set at a depth of up to 13 feet bgs. Actual sparge point depths will be determined in the field based on the stratigraphy encountered within each installation point. Annular space around the diffusers will be filled with #60 sand from the bottom of the sparge point to 1 foot above the diffuser, and then sealed with cement grout to 1 foot bgs. A $\frac{3}{4}$ -inch rigid PVC pipe will deliver the tubing from the distribution trench to an access box for the well. Inside the well box, the inner tubing will be connected to a 90° Kynar compression fitting elbow. The Kynar elbow is connected to a 2-inch length of $\frac{3}{8}$ -inch OD Teflon tubing which is connected to a Kynar compression fitting backflow valve and threaded into a 90° PVC elbow, which is glued to the top of the PVC riser. The access box will be traffic-rated aluminum with a bolt-down lid, set in an apron of high-strength grout.

9. Start-up Test

A start-up test will be performed following installation of the oxygen sparging system. The start-up test will run long enough to check the system for leaks, make visual inspections and collect field measurements in monitoring wells within the treatment area. Depth to groundwater measurements, dissolved oxygen, and conductivity measurements will be collected from nearby monitoring wells.

C. System Monitoring

1. Monitoring Well Network

Tabulated key and perimeter monitoring well information is included below as Table D, and includes active remedial goals for the remedial system.

Table D: Key and Perimeter Monitoring Well Designations					
Key Monitoring Wells		Perimeter Monitoring Wells			
MW4, MW5, MW7, MW8, MW16		MW1, MW2, MW3, MW6, MW14, MW15			
ARGs ($\mu\text{g/L}$)					
Benzene	Toluene	Ethylbenzene	Xylenes	MtBE	TPHg
100	42	100	100	1500	1000

2. *Proposed Monitoring*

Following the pressure test, a treatment-array monitoring schedule will be implemented. A preliminary monitoring schedule follows. Groundwater samples will be collected bi-monthly from key and perimeter monitoring wells within the treatment zone for a 6-month period. Following the bi-monthly monitoring, samples will be collected monthly for the remainder of the year, with quarterly for the remainder of the project. Quarterly sampling will continue in the remainder of the wells associated with this site. Analytes will include TPHg, BTEX, and five fuel oxygenates by EPA Method 8260, the by-product TBF, and total/dissolved chromium, bromate, and bromide, all analyzed on a quarterly basis. Field measurements will be made for dissolved oxygen, pH, temperature, conductivity, and oxidation reduction potential.

Procedures involved in implementation of this RAP are as outlined in the *LACO Standard Operating Procedure No. 1* (SOP) included as Attachment 1. An updated *Hazardous Waste Operating Safety Training and Medical Monitoring* (HAZWOPER) list of LACO personnel is included as Attachment 2.

LIST OF FIGURES, TABLES, AND ATTACHMENTS

- Figure 1: Location Map
- Figure 2: Site Map with Cross-Section Lines
- Figure 3: Benzene Concentration in Groundwater; Stratigraphic Cross Section E-E'
- Figure 4: MTBE Concentration in Groundwater; Stratigraphic Cross Section E-E'
- Figure 5: Sorbed TPH Isoconcentration Map
- Figure 6: Electrical Panel Layout
- Figure 7: Single-Point Sparge Well Detail
- Figure 8: Trench Detail
- Figure 9: Sparge Well and Trench Location Maps

- Table 1: Historic Soil Analytical Results
- Table 2: Historic Groundwater Analytical Results
- Table 3: Well Data and Groundwater Analytical Results, Quarterly Monitoring Events

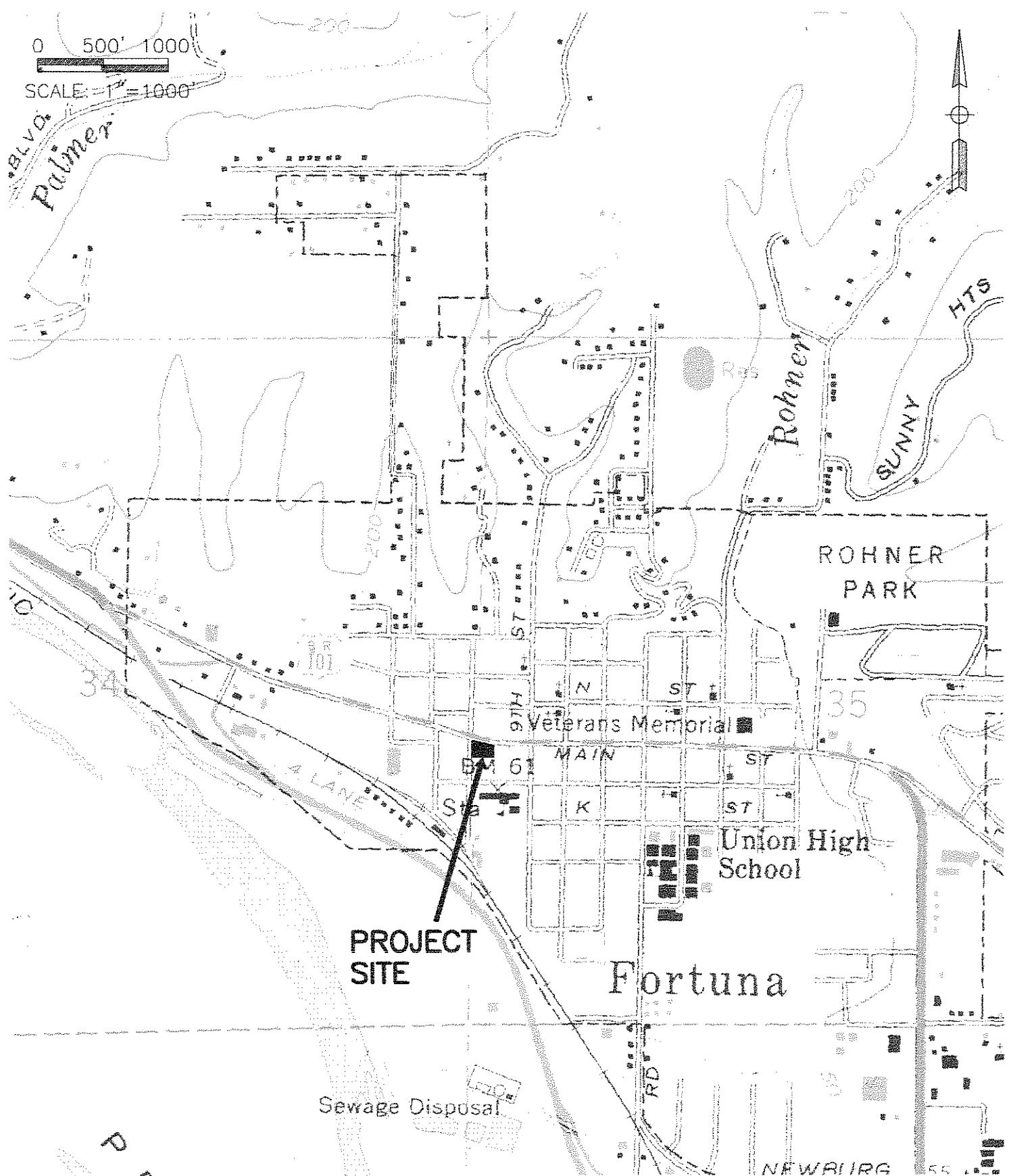
Attachment 1: LACO Standard Operating Procedure

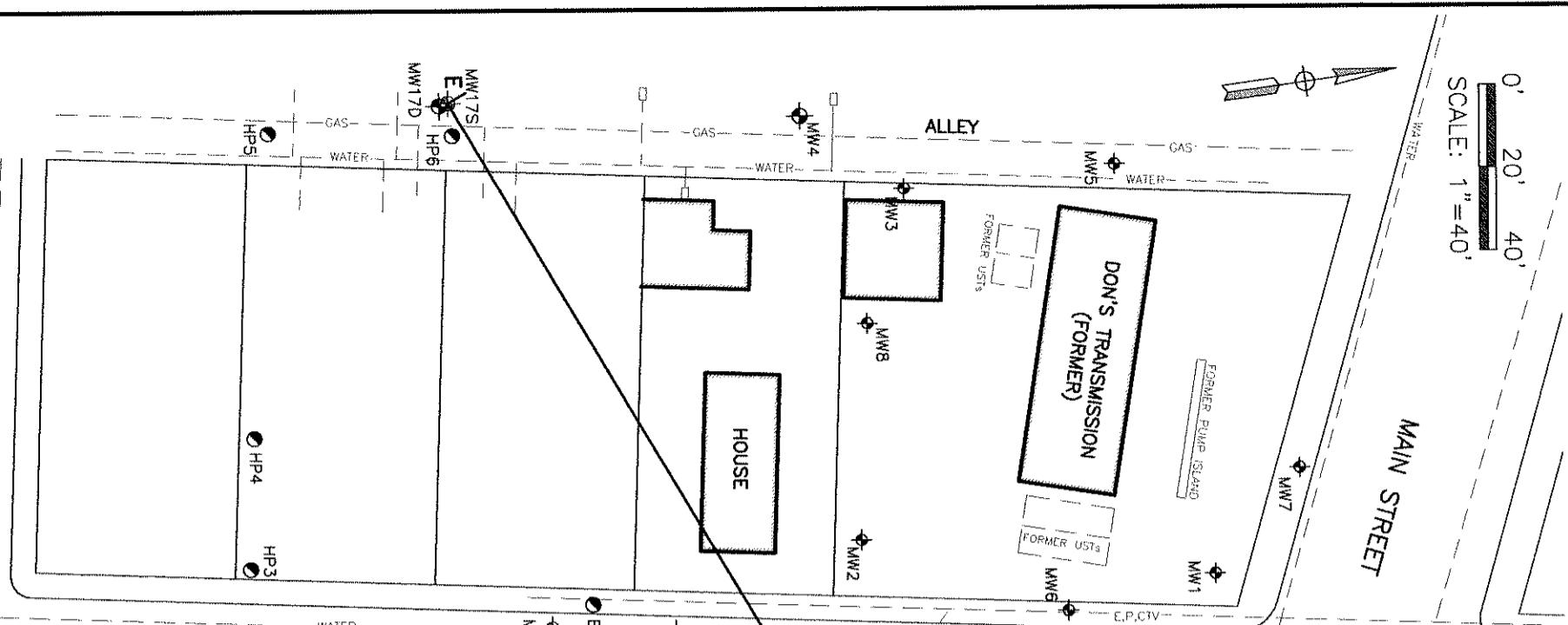
Attachment 2: Updated HAZWOPER List



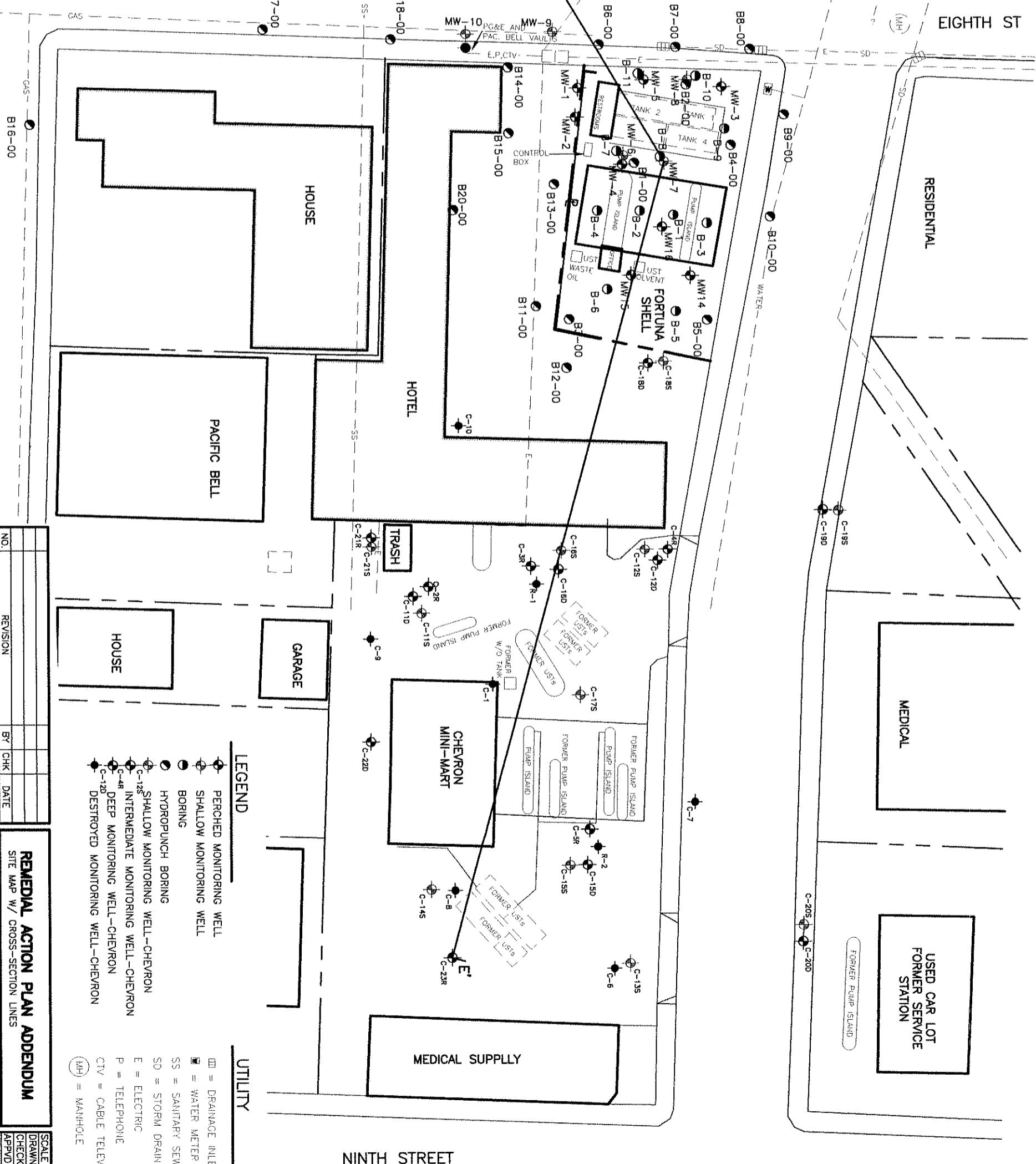
LACO ASSOCIATES
CONSULTING ENGINEERS
21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT	REMEDIAL ACTION PLAN ADDENDUM	BY	RJM	FIGURE
CLIENT	HUMBOLDT PETROLEUM INC	DATE	4/20/05	1
LOCATION	FORTUNA SHELL	CHECK	gr	JOB NO.
	LOCATION MAP	SCALE	1 = 1000'	4563.01





EIGHTH STREET



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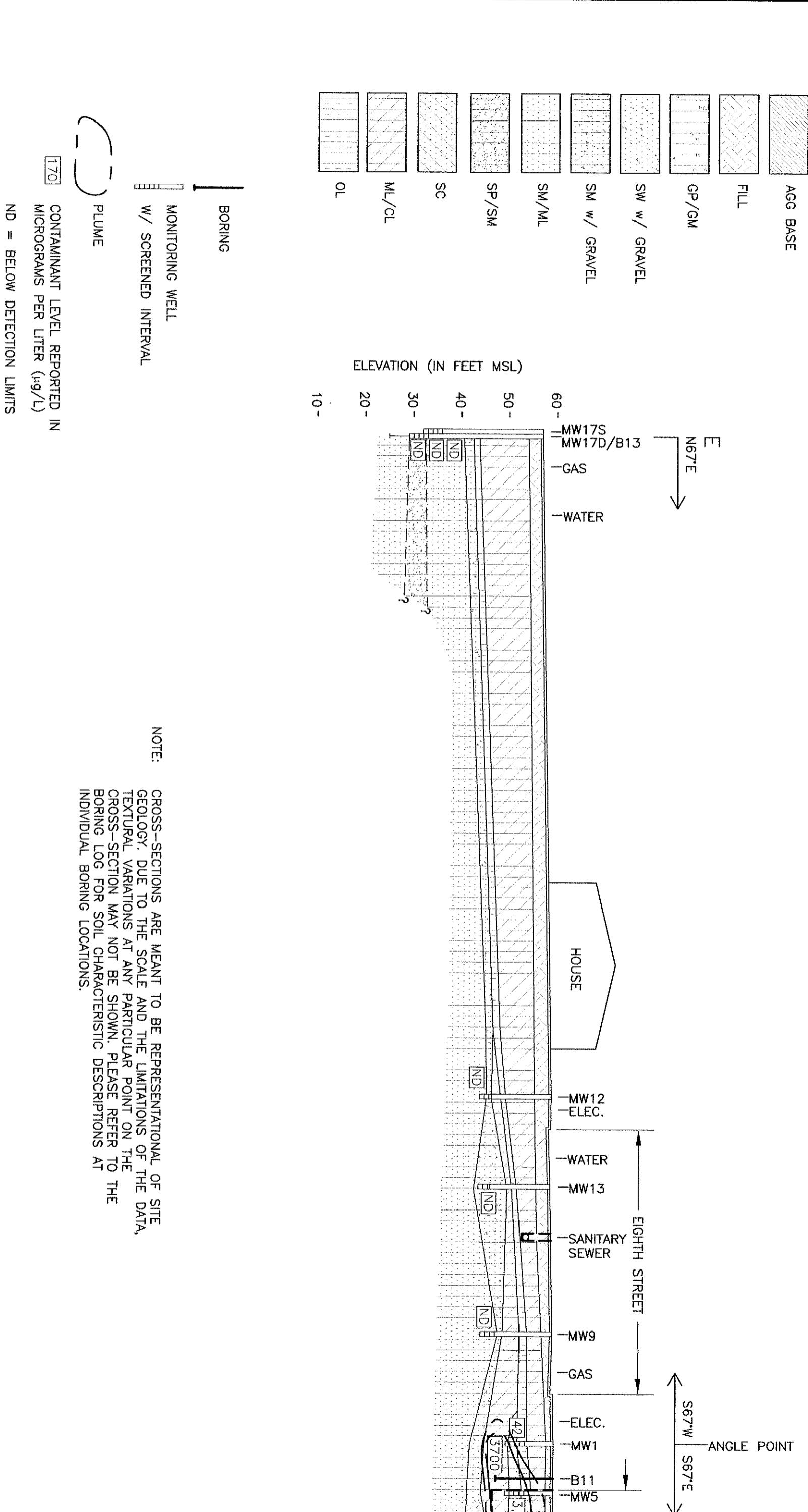
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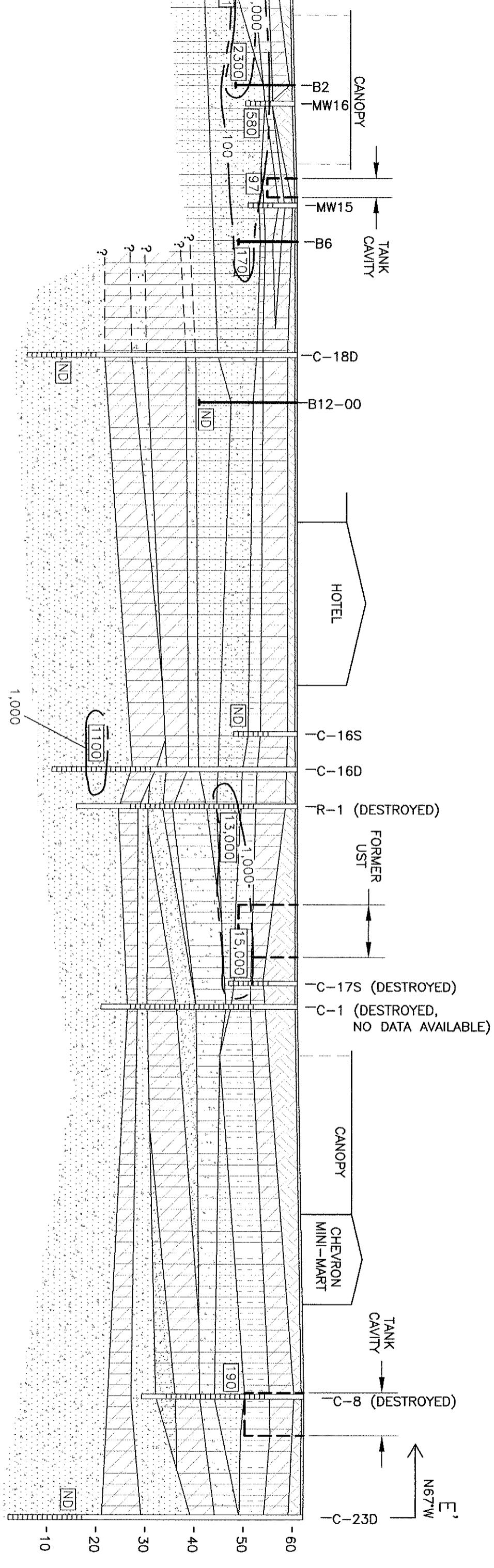
SITE MAP W/ CROSS-SECTION LINES

NO. BY CHK DATE APPROVED
APR 2005

JOB NO.
4563-01

FIGURE
2





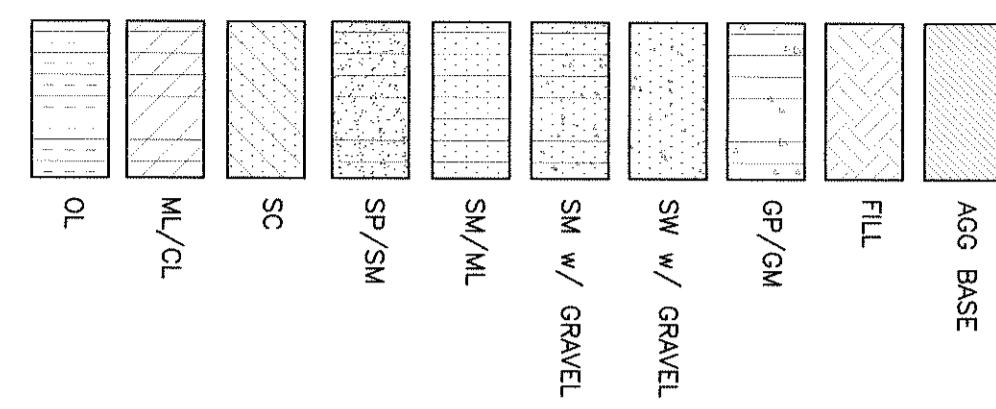
REVISION	BY	CHK	DATE

REMEDIAL ACTION PLAN ADDENDUM			
BENZENE CONCENTRATION IN GROUNDWATER			
STRATIGRAPHIC CROSS-SECTION E-E'			

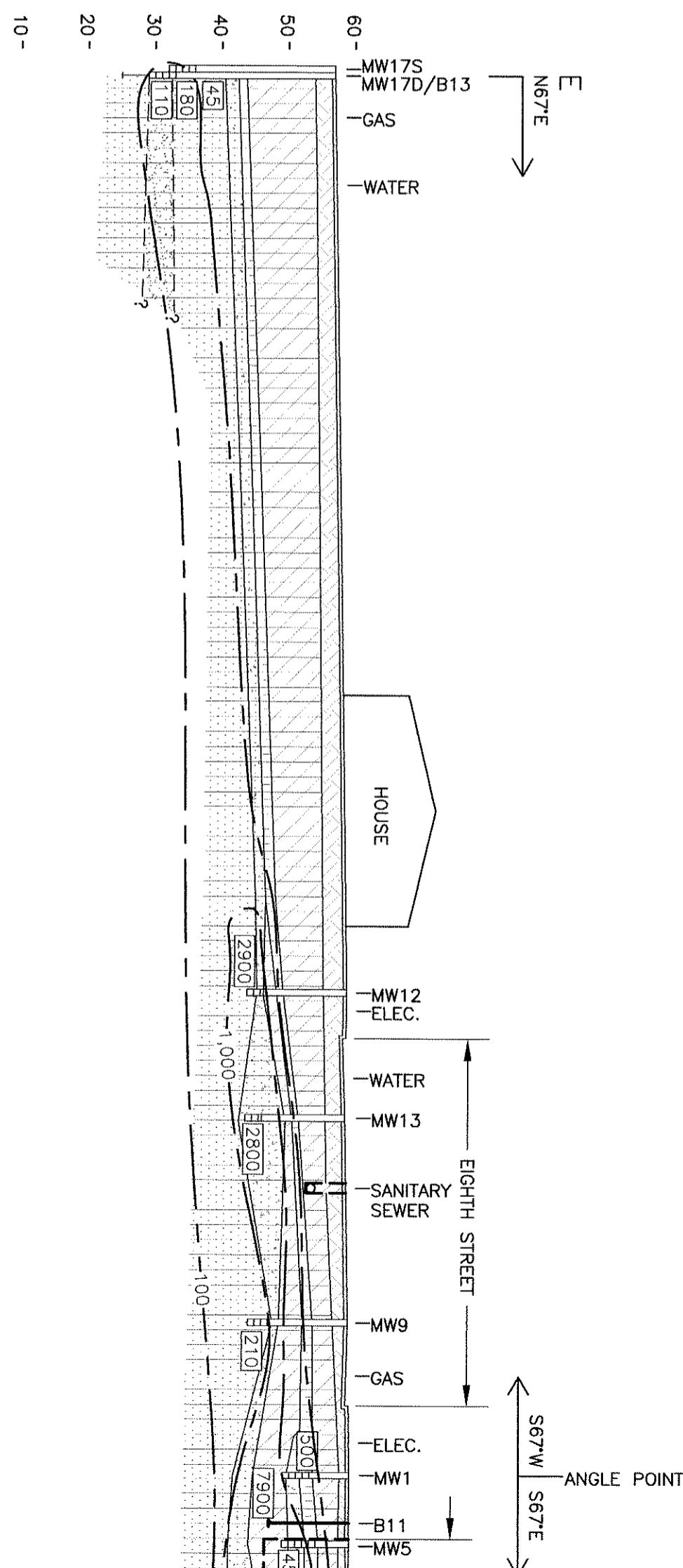
SCALE 1"-20' DRAWN BAB	CHECK C.P.V.D.	APPROVED DATE 3/29/05	JOB NO. 4563.01
FIGURE 3			

LACO ASSOCIATES
CONSULTING ENGINEERS
21 W. 4TH ST. EUREKA, CA 95501 (707)443-5054

HUMBOLDT PETROLEUM, INC.
FORTUNA SHELL
819 MAIN STREET, FORTUNA



ELEVATION (IN FEET MSL)

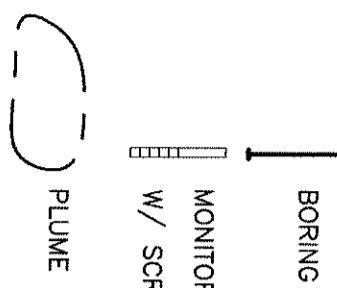


NOTE: CROSS-SECTIONS ARE MEANT TO BE REPRESENTATIONAL OF SITE GEOLOGY. DUE TO THE SCALE AND THE LIMITATIONS OF THE DATA, TEXTURAL VARIATIONS AT ANY PARTICULAR POINT ON THE CROSS-SECTION MAY NOT BE SHOWN. PLEASE REFER TO THE BORING LOG FOR SOIL CHARACTERISTIC DESCRIPTIONS AT INDIVIDUAL BORING LOCATIONS.

[210]

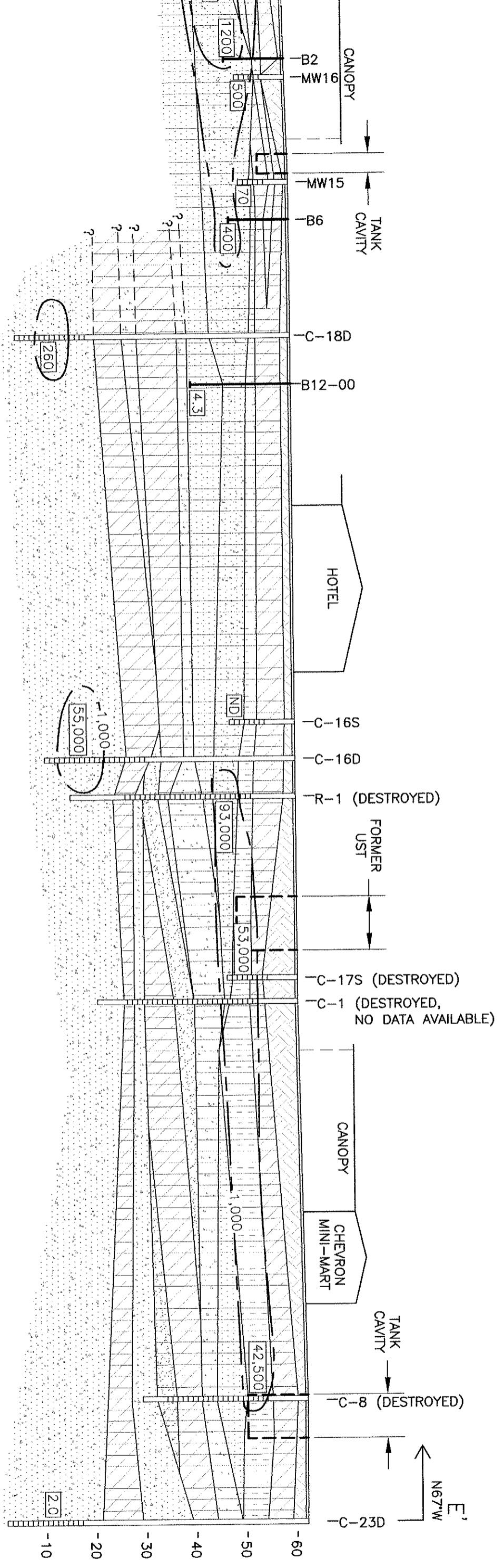
CONTAMINANT LEVEL REPORTED IN
MICROGRAMS PER LITER ($\mu\text{g}/\text{L}$)

ND = BELOW DETECTION LIMITS



MONITORING WELL
W/ SCREENED INTERVAL

PLUME



REVISION	BY	CHK	DATE
LACO ASSOCIATES CONSULTING ENGINEERS 21 W. 4TH ST., EUREKA, CA 95501 (707)443-5054			

REMEDIAL ACTION PLAN ADDENDUM MTBE CONCENTRATION IN GROUNDWATER STRATIGRAPHIC CROSS-SECTION E-E'			
HUMBOLDT PETROLEUM, INC. FORTUNA SHELL 819 MAIN STREET, FORTUNA			

SCALE DRAWN CHECK APPROV'D DATE JOB NO. FIGURE	1' = 20' BAB _____ _____ 3/28/05 44553.01 4
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0' 20' 40'
SCALE: 1"=40'

MAIN STREET

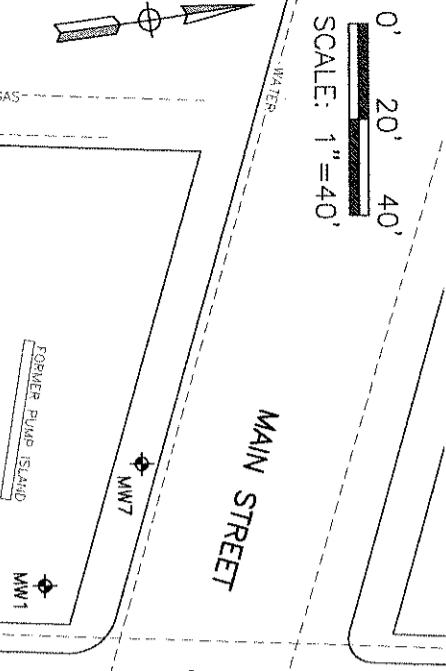
EIGHTH ST

RESIDENTIAL

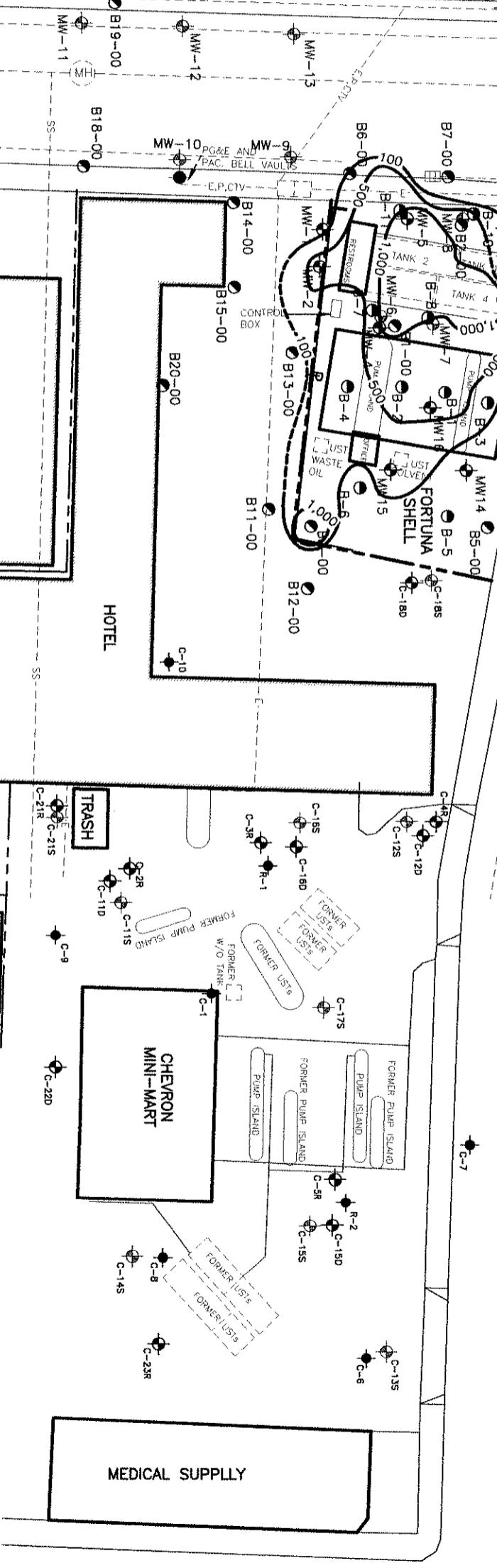
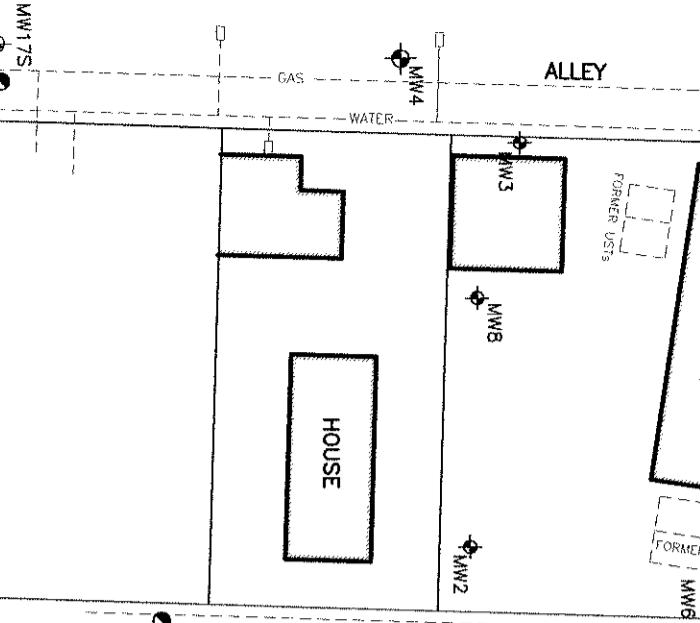
MEDICAL

USED CAR LOT
FORMER SERVICE
STATION

FORMER PUMP ISLAND



EIGHTH STREET



NINTH STREET

ALL RESULTS REPORTED IN
MICROGRAMS PER GRAM ($\mu\text{g/g}$)

PERCHED MONITORING WELL
SHALLOW MONITORING WELL
HYDROPUCK BORING
INTERMEDIATE MONITORING WELL—CHEVRON
DEEP MONITORING WELL—CHEVRON
DESTROYED MONITORING WELL—CHEVRON
—4,000— SORBED TPH ISOCONCENTRATION LINES
— DASHED WHERE INFERRED

DRAINAGE INLET
WATER METER
SANITARY SEWER
STORM DRAIN
E = ELECTRIC
P = TELEPHONE
CTV = CABLE TELEVISION
(MH) = MANHOLE

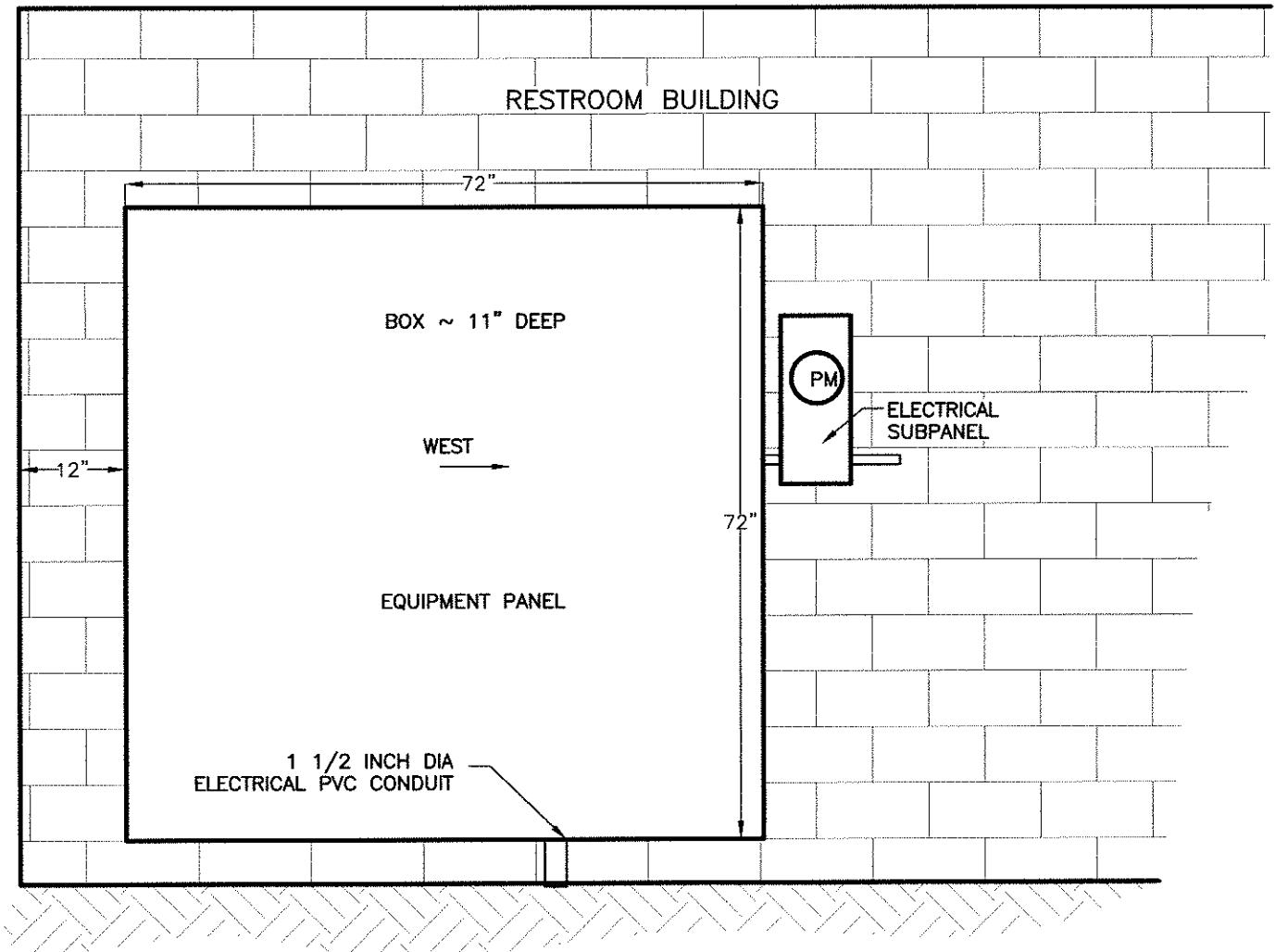
REMEDIAL ACTION PLAN ADDENDUM
SOREBD TPH ISOCONCENTRATION MAP
NO. BY CHK DATE
APPROVED DATE
JOB NO. FIGURE

1"=40'
DRAWN BY RUM
CHECKED BY
APPROVED BY
DATE 4/20/05
JOB NO. 4563-01
FIGURE 5



LACO ASSOCIATES
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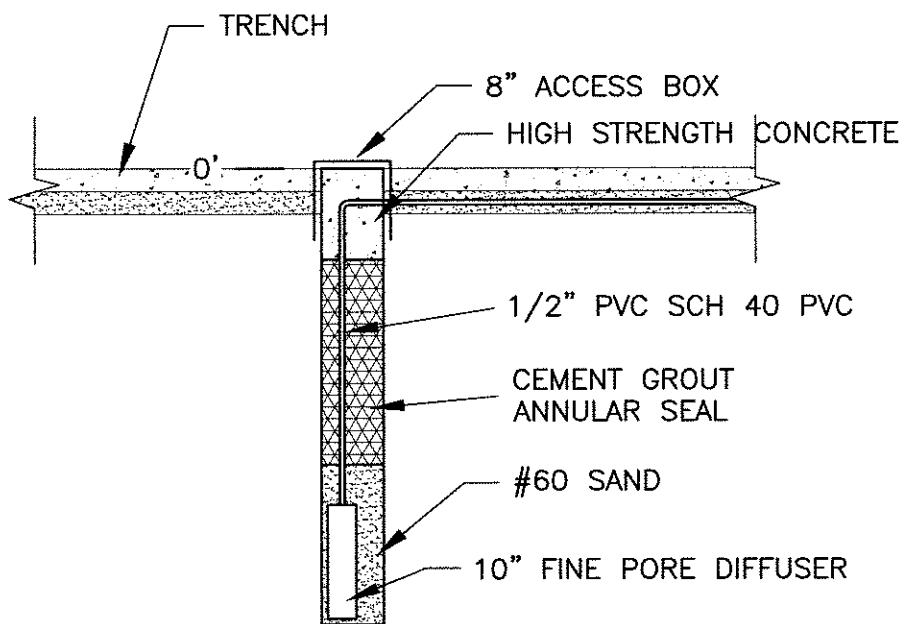
PROJECT	REMEDIAL ACTION PLAN ADDENDUM	BY	RJM	FIGURE	6
CLIENT	HUMBOLDT PETROLEUM INC	DATE	4/20/05		
LOCATION	HPI FORTUNA SHELL	CHECK	<i>gr</i>	JOB NO.	
	ELECTRICAL PANEL LAYOUT	SCALE	N.T.S.		4563.01





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PROJECT	REMEDIAL ACTION PLAN ADDENDUM	BY	RJM	FIGURE
CLIENT	HUMBOLDT PETROLEUM INC	DATE	4/20/05	7
LOCATION	HPI FORTUNA SHELL	CHECK	<i>[Signature]</i>	JOB NO.
	SINGLE-POINT SPARGE WELL DETAIL	SCALE	N.T.S.	4563.01

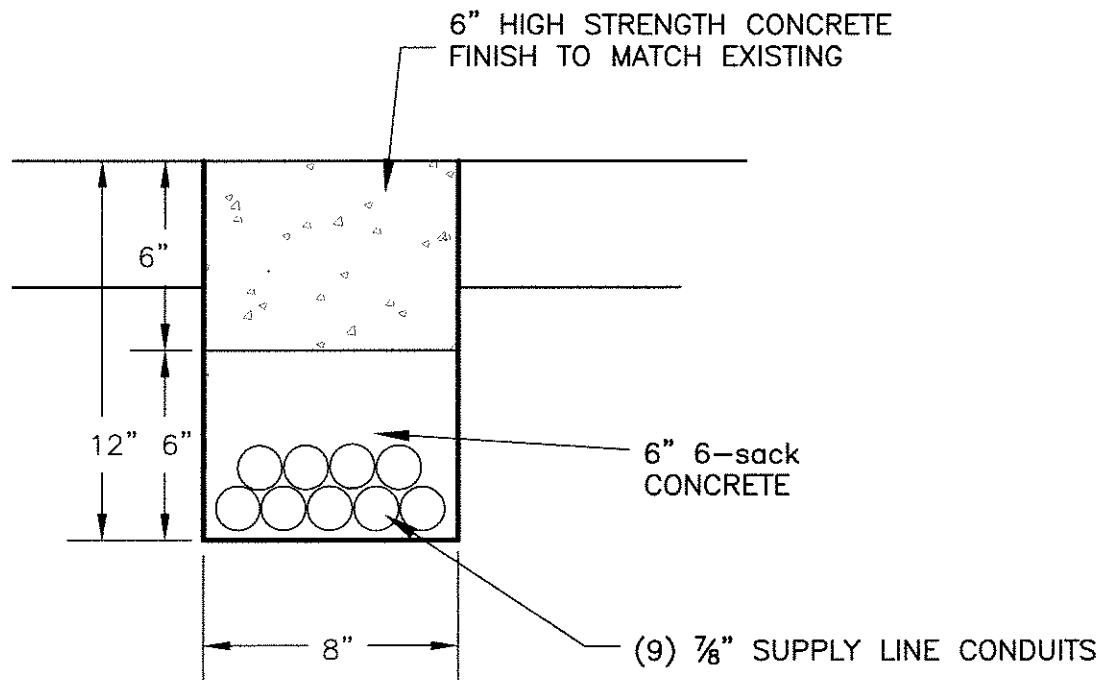


NOT TO SCALE



LACO ASSOCIATES
CONSULTING ENGINEERS
21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT	REMEDIAL ACTION PLAN ADDENDUM	BY	RJM	FIGURE	8
CLIENT	HUMBOLDT PETROLEUM INC	DATE	4/20/05		
LOCATION	HPI FORTUNA SHELL	CHECK	<i>gr</i>	JOB NO.	
	TRENCH DETAIL	SCALE	N.T.S.		4563.01



NOT TO SCALE



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PROJECT	REMEDIAL ACTION PLAN ADDENDUM	BY	RJM	FIGURE	9
CLIENT	HUMBOLDT PETROLEUM INC.	DATE	4/20/05		
LOCATION	FORTUNA SHELL	CHECK	gn	JOB NO.	
	SPARGE WELL & TRENCH LOCATION MAPS	SCALE	1" = 20'		4563.01

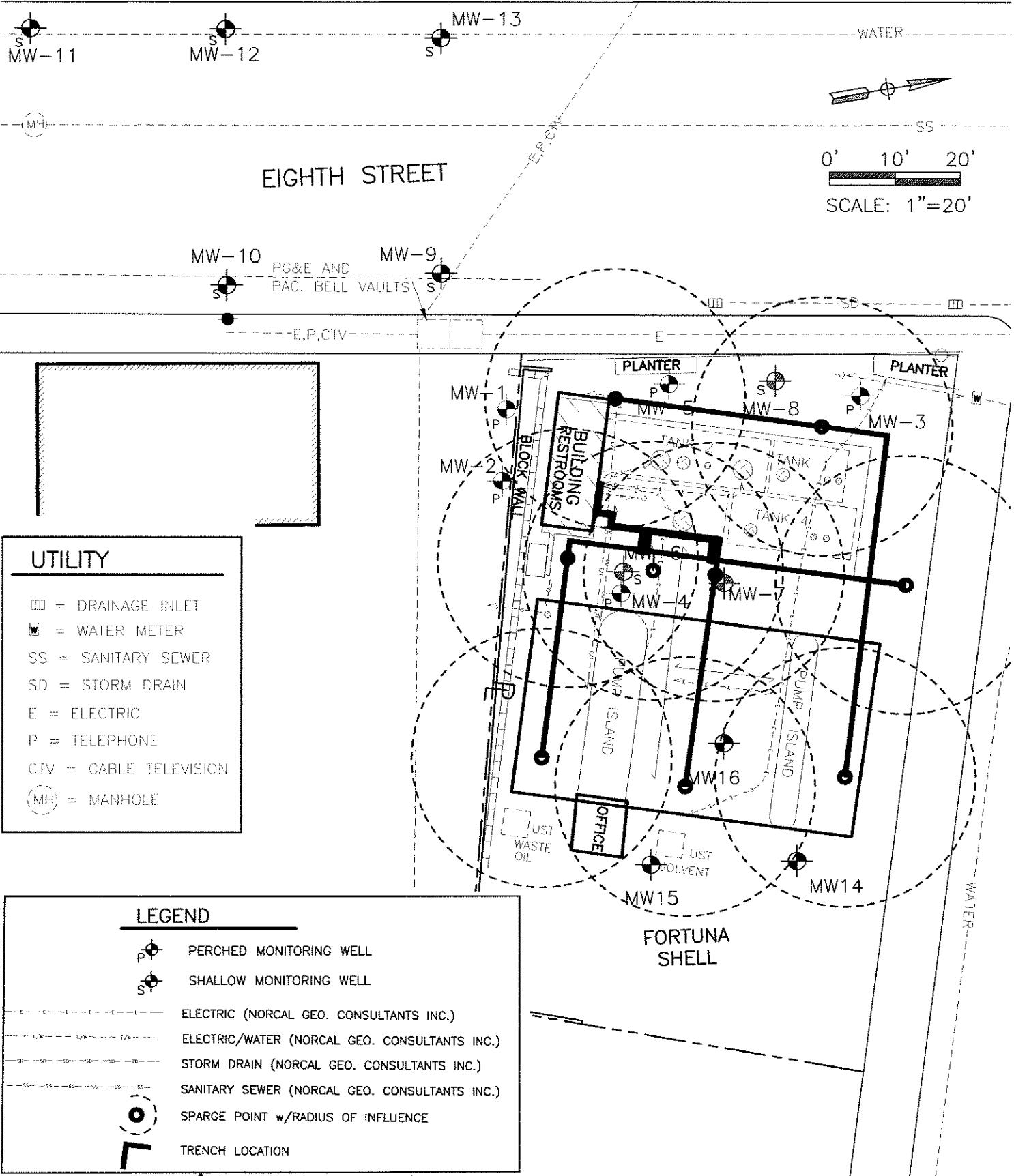


TABLE 1: HISTORIC SOIL ANALYTICAL RESULTS

HPI / Fortuna Shell, 819 Main St, Fortuna, CA
LACO No. 4563.01; LOP No. 12672

Sample Location	Sample Depth (feet)	Sample Date	TPHg ($\mu\text{g/g}$)	TPHd ($\mu\text{g/g}$)	TPHmo ($\mu\text{g/g}$)	Benzene ($\mu\text{g/g}$)	Toluene ($\mu\text{g/g}$)	Ethylben-zene ($\mu\text{g/g}$)	Xylenes ($\mu\text{g/g}$)	Fuel Oxygenates ($\mu\text{g/g}$)	Lead Scavengers ($\mu\text{g/g}$)
Pre-UST Closure Investigation											
4563-B1	5	8/10/1998	3.5	50	—	0.25	ND<0.4	ND<0.2	ND<0.2	MTBE=0.94	—
	10	8/10/1998	8.4	ND<1.0	—	0.011	ND<0.04	ND<0.06	ND<0.06	MTBE=0.069	—
4563-B2	5	8/10/1998	520	38	—	ND<1.5	ND<4.0	ND<8.0	ND<8.0	MTBE=0.74	—
	10	8/10/1998	6.9	ND<1.0	—	ND<0.03	ND<0.04	ND<0.06	ND<0.06	MTBE=0.065	—
4563-B3	5	8/10/1998	400	59	—	ND<1.0	0.3	ND<3.0	ND<7.0	MTBE=0.83	—
	10	8/10/1998	ND<1.0	ND<1.0	—	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.050	—
4563-B4	5	8/10/1998	44	1.3	—	ND<0.07	ND<0.2	ND<0.32	ND<0.32	MTBE=0.088	—
	10	8/10/1998	ND<1.0	ND<1.0	—	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE=0.054	—
4563-B5	5	8/10/1998	ND<1.0	ND<1.0	—	ND<0.005	ND<0.005	ND<0.16	ND<0.16	ND<0.050	—
	10	8/10/1998	ND<1.0	ND<1.0	—	ND<0.005	ND<0.005	ND<0.050	ND<0.050	ND<0.050	—
4563-B6	5	8/10/1998	16	3.2	—	ND<0.04	ND<0.04	ND<0.20	ND<0.20	MTBE=0.085	—
	10	8/10/1998	8.4	6.2	—	ND<0.02	ND<0.10	ND<0.10	ND<0.10	MTBE=0.092	—
4563-B7	5	8/11/1998	230	12	—	0.62	ND<2.0	ND<2.0	ND<2.0	MTBE=1.1	—
	10	8/11/1998	3.4	ND<1.0	—	0.016	ND<0.02	ND<0.04	ND<0.04	MTBE=0.11	—
AUGER	10	8/11/1998	1,400	28	—	3.0	ND<12	17	94	ND<10	—
4563-B9	5	8/11/1998	1.4	ND<1.0	—	0.025	ND<0.005	ND<0.005	ND<0.005	MTBE=0.085	—
	10	8/11/1998	10	ND<1.0	—	ND<0.04	ND<0.08	ND<0.08	ND<0.08	MTBE=0.14	—
4563-B10	5	8/11/1998	520	51	—	1.1	ND<5.0	ND<5.0	ND<2.0	MTBE=2.9	—
	10	8/11/1998	7.8	ND<1.0	—	ND<0.04	ND<0.08	0.07	0.09	MTBE=0.39	—
4563-B11	5	8/11/1998	1,000	27	—	2.7	ND<20	ND<10	ND<10	MTBE=7.3	—
	10	8/11/1998	33	1.2	—	0.082	ND<0.5	0.24	0.34	MTBE=0.78	—
UST Closure											
4563#1	9'	11/11/1998	160	1.4	18	ND<0.050	ND<0.050	0.4	0.39	ND<0.50	—
4563#2	9'	11/11/1998	340	3.9	20	ND<0.050	ND<0.40	1.8	1.3	MTBE= 0.8	—
4563#3	9'	11/11/1998	16	55	320	ND<0.0050	ND<0.020	0.039	0.039	MTBE= 0.065	—
4563#4	9'	11/11/1998	630	---	---	150	ND<0.025	690	450	MTBE= 51	—
4563#5	3'	11/11/1998	2.5	ND<1.0	ND<10	0.092	0.0079	0.014	0.038	MTBE= 0.021	—
4563#6	3'	11/11/1998	34	ND<1.0	10	0.7	0.23	0.59	0.67	MTBE= 3.5	—
4563#7	3'	11/11/1998	62	3.5	ND<10	0.2	ND<0.20	ND<0.40	ND<0.40	MTBE= 0.82	—
4563#8	3'	11/11/1998	9.8	2.9	35	0.14	0.094	0.064	0.12	ND<0.50	—
4563#9	3'	11/11/1998	1.7	ND<1.0	ND<10	0.061	ND<0.0050	0.0065	0.018	TBA=0.01	—
4563#10	3'	11/11/1998	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	—
2000 Investigation											
MW 1	5.0'	7/25/2000	3.6	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.02
	9.0'	7/25/2000	ND<1000.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.0058	ND<0.02
	10.0'	7/25/2000	ND<1000.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.0066	ND<0.02
MW 2	5.0'	7/25/2000	96	10	ND<10.0	ND<0.016	ND<0.016	ND<0.016	ND<0.016	ND<0.016	ND<0.04
	7.0'	7/25/2000	830	32	10	ND<0.16	ND<0.16	0.18	0.16	ND<0.16	ND<0.04
	10.0'	7/25/2000	ND<1000	ND<1.0	ND<10	0.0071	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.0046	ND<0.02
MW 3	5.0'	7/25/2000	110	13	47	ND<0.04	ND<0.04	ND<0.04	ND<0.04	MTBE = 0.081	ND<0.1
	10.0'	7/25/2000	ND<1000.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.055	ND<0.02
	12.0'	7/25/2000	ND<1.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.13	ND<0.02
	15.0'	7/25/2000	ND<1.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.83	ND<0.02
MW 4	2.0'	7/26/2000	4.8	ND<1.0	ND<10.0	0.042	ND<0.005	0.012	0.0404	MTBE = 0.018	ND<0.02
	5.0'	7/26/2000	4.9	ND<1.0	ND<10.0	0.059	ND<0.005	ND<0.005	0.013	MTBE = 0.028	ND<0.02
	7.0'	7/26/2000	20	1.4	ND<10.0	0.022	ND<0.008	0.037	0.018	MTBE = 0.013	ND<0.02
	10.0'	7/26/2000	ND<1.0	ND<1.0	ND<10.0	0.016	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.013	ND<0.02
MW 5	5.0'	7/26/2000	1500	23	14	1.4	0.17	4.5	7.34	MTBE = 0.35	ND<0.4
	8.0'	7/26/2000	670	10	22	0.67	ND<0.8	5.5	2.69	MTBE = 0.32	ND<0.002
	10.0'	7/26/2000	17	9.7	21	0.0089	ND<0.005	0.0085	0.0058	MTBE = 0.09	ND<0.002
	15.0'	7/26/2000	ND<1.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.75	ND<0.002
MW 6	15.0'	7/26/2000	1.5	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.019	ND<0.002
MW 7	5.0'	7/27/2000	730	230	3100	2.4	0.56	1.8	19.58	MTBE = 0.12	ND<0.02
	10.0'	7/27/2000	ND<1.0	ND<1.0	ND<10.0	0.016	ND<0.005	0.0053	0.0053	MTBE = 0.066	ND<0.002
	14.0'	7/27/2000	ND<1.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.013	ND<0.002
MW 8	2.0'	7/27/2000	8.2	ND<1.0	ND<10.0	0.093	ND<0.005	0.009	0.026	MTBE = 0.2	ND<0.002
	5.0'	7/27/2000	1400	17	44	2.5	0.2	1.7	1.6	MTBE = 1.1	ND<0.4
	10.0'	7/27/2000	ND<1.0	ND<1.0	ND<10.0	0.0052	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.5	ND<0.002
	20.0'	7/27/2000	ND<1.0	ND<1.0	ND<10.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = 0.83	ND<0.002
BJ-00	8.0'	5/17/2000	1,400	100	610	ND<2.0	ND<8.0	10	25.0	MTBE ND<5.0	—
	10.0'	5/17/2000	ND<1.0	ND<1.0	ND<10	0.014	ND<0.005	ND<0.005	0.0066	MTBE ND<0.05	—
	17.0'	5/17/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	0.0055	ND<0.005	0.0081	MTBE = 0.16	—
	24.0'	5/17/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	0.0062	MTBE ND<0.05	—
	27.0'	5/17/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	—
	29.0'	5/17/2000	1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	—
	34.0'	5/17/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	—
	39	5/17/2000	1.7	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	—

TABLE 1: HISTORIC SOIL ANALYTICAL RESULTS

HPI / Fortuna Shell, 819 Main St, Fortuna, CA
 LACO No. 4563.01; LOP No. 12672

Sample Location	Sample Depth (feet)	Sample Date	TPHg (µg/g)	TPHd (µg/g)	TPHmo (ng/g)	Benzene (ng/g)	Toluene (µg/g)	Ethylben-zene (µg/g)	Xylenes (µg/g)	Fuel Oxygenates (µg/g)	Lead Scavengers (µg/g)
2000 Investigation, continued											
B2-00	3.0'	5/18/2000	15	1.4	ND<10	0.087	ND<0.08	ND<0.04	ND<0.04	MTBE = 0.22	---
	9.0'	5/18/2000	18	ND<1.0	ND<10	ND<0.005	ND<0.01	ND<0.1	ND<0.1	MTBE = 0.065	---
	14.0'	5/18/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	19.0'	5/18/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE = .059	---
	24.0'	5/18/2000	ND<1.0	ND<1.0	ND<10	0.067	ND<0.005	ND<0.005	ND<0.01	MTBE ND<0.05	---
B3-00	9.0'	5/22/2000	9.4	170	1,100	ND<0.005	ND<0.01	ND<0.08	ND<0.08	MTBE ND<0.05	---
	14.0'	5/22/2000	3.2	18	120	ND<0.005	ND<0.005	ND<0.02	ND<0.002	MTBE ND<0.05	---
	19.0'	5/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B4-00	3.0'	5/24/2000	12	ND<1.0	ND<10	0.099	ND<0.1	ND<0.06	ND<0.06	MTBE ND<0.05	---
	6.0'	5/24/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	9.0'	5/24/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	14.0'	5/24/2000	4.9	ND<1.0	ND<10	0.0057	ND<0.03	ND<0.03	ND<0.03	MTBE = 0.099	---
	19.0'	5/24/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B6-00	2.0'	11/22/2000	1.6	1.1	ND<10	ND<0.005	ND<0.005	0.005	0.014	MTBE ND<0.05	---
	7.0'	11/22/2000	670	48	49	0.59	ND<8.0	ND<10	ND<10	MTBE ND<0.05	---
	9.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B7-00	2.0'	11/22/2000	8.3	1.8	ND<10	0.0075	ND<0.04	ND<0.04	.05	MTBE ND<0.05	---
	6.0'	11/22/2000	4.2	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.02	ND<0.02	MTBE ND<0.05	---
	9.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE= 0.37	---
B8-00	2.0'	11/22/2000	ND<1.0	1.3	19	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	5.0'	11/22/2000	ND<1.0	1.1	18	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	10.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	15.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B9-00	2.0'	11/22/2000	2.3	ND<1.0	ND<10	ND<0.005	ND<0.015	ND<0.005	ND<0.03	MTBE ND<0.05	---
	7.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	10.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	15.0'	11/22/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B10-00	2.0'	11/22/2000	2.3	ND<1.0	ND<10	ND<0.005	ND<0.01	ND<0.005	ND<0.03	MTBE ND<0.05	---
	5.0'	11/22/2000	ND<1.0	ND<1.0	10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B11-00	4.5'	11/27/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	8.0'	11/27/2000	6.2	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.07	ND<0.07	MTBE ND<0.05	---
	10.0'	11/27/2000	ND<1.0	3.6	71	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B12-00	4.5'	11/27/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	15.0'	11/27/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B13-00	4.0'	11/28/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	7.0'	11/28/2000	7.2	51	430	ND<0.005	ND<0.060	ND<0.15	ND<0.15	MTBE ND<0.05	---
B14-00	4.0'	11/28/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.5	---
	13.0'	11/28/2000	4.7	1.3	42	ND<0.005	ND<0.005	ND<0.04	ND<0.04	MTBE ND<0.05	---
B15-00	4.5'	11/29/2000	1.8	ND<1.0	30	ND<0.005	ND<0.005	ND<0.02	ND<0.02	MTBE ND<0.05	---
	7.0'	11/29/2000	2.1	2.5	120	ND<0.005	ND<0.01	ND<0.02	ND<0.02	MTBE ND<0.05	---
B16-00	5.0'	12/18/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	8.0'	12/18/2000	ND<1.0	ND<1.0	20	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B17-00	5.0'	12/18/2000	1.1	3.2	17	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	15.0'	12/18/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B18-00	5.0'	12/19/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	8.0'	12/19/2000	1.9	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	12.0'	12/19/2000	1.3	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	15.0'	12/19/2000	1.5	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B19-00	5.0'	12/19/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	10.0'	12/19/2000	ND<1.0	ND<1.0	ND<10	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
B20-00	5.0'	12/20/2000	ND<1.0	ND<1.0	12	ND<0.005	ND<0.005	ND<0.005	ND<0.005	MTBE ND<0.05	---
	7.0'	12/20/2000	3	2.1	75	ND<0.005	ND<0.005	ND<0.01	ND<0.005	MTBE ND<0.05	---
	9.0'	12/20/2000	160	3.2	42	ND<0.005	ND<0.3	ND<1.0	ND<1.0	MTBE ND<0.05	---
2004 Investigation											
4563-MW14-S4	4	9/21/2004	2.6	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-MW14-S10	10	9/21/2004	ND<1.0	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-MW15-S4	4	9/21/2004	1.7	---	---	0.0096	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-MW15-S8	8	9/21/2004	220	---	---	0.039	ND<0.0050	0.54	2.4	ND<0.020-0.50	---
4563-MW16-S4	4	9/21/2004	560	---	---	1.8	0.26	1.0	2.6	ND<1.0-2.5	---
4563-MW16-S9	9	9/21/2004	1.8	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	MTBE=0.057	---
										All others ND<0.020-0.50	
4563-B12-S12.0	12	9/30/2004	ND<1.0	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-B12-S16.0	16	9/30/2004	ND<1.0	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-B12-S20.0	20	9/30/2004	ND<1.0	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---
4563-B12-S24.0	24	9/30/2004	ND<1.0	---	---	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020-0.50	---

TABLE 2: HISTORIC GROUNDWATER ANALYTICAL RESULTS

HPI / Fortuna Shell, 819 Main St, Fortuna, CA

LACO No. 4563.01; LOP No. 12672

Sample Number	Sample Date	TPHg ($\mu\text{g/l}$)	TPHd ($\mu\text{g/l}$)	TPHmo ($\mu\text{g/l}$)	Benzene ($\mu\text{g/l}$)	Toluene ($\mu\text{g/l}$)	Ethylbenzene ($\mu\text{g/l}$)	Xylenes ($\mu\text{g/l}$)	Fuel Oxygenates ($\mu\text{g/L}$)	Lead Scavengers ($\mu\text{g/l}$)
Pre-UST Closure Investigation										
4563-B1	8/10/1998	46,000	190,000	---	3,300	160	890	760	MTBE=2,700 ETBE=57	ND
4563-B2	8/10/1998	100,000	34,000	---	2,300	ND<1000	1,200	2,320	MTBE=1,200	ND
4563-B3	8/10/1998	47,000	130,000	---	2,200	920	1,280	2,950	MTBE=1,200	---
4563-B4	8/10/1998	11,000	670	---	680	ND<100	ND<13	47	MTBE=270	---
4563-B5	8/10/1998	11,000	93,000	---	ND<100	ND<50	25	ND<13	MTBE=170	---
4563-B6	8/10/1998	12,000	1,500,000	---	170	ND<100	62	82	MTBE=400	---
4563-B7	8/11/1998	38,000	31,000	---	2,800	ND<200	240	290	MTBE=1,200	---
4563-B8	8/11/1998	82,000	79,000	---	4,000	660	2,900	16,000	MTBE=1,000	ND
4563-B9	8/11/1998	22,000	2,300	---	1,600	ND<200	480	590	MTBE=1,900	---
4563-B10	8/11/1998	37,000	88,000	---	4,800	870	670	1,300	MTBE=19,000	---
4563-B11	8/11/1998	38,000	3,700	---	3,700	ND<1000	820	640	MTBE=7,900	ND
UST Closure										
UST CAVITY	11/11/1998	210,000	4,000,000	ND<2,500,000	310	520	3800	29000	3300	---
B1-00 1A	5/17/2000	18,000	2,800	460	1,400	130	390	632	MTBE = 370 TAME = 36	ALL ND
B1-00 2A	5/17/2000	960	180	ND<170	27	7.5	23	45.3	MTBE = 860 TBA = 71 DIPE = 2.7 TAME = 13 ETBE = 5.4	ALL ND
B2-001A	5/17/2000	32,000	5,600	6,600	1,400	320	1,200	2,430	MTBE = 5500 TAME = 260	ALL ND
B2-00 2A	5/18/2000	4,500	3,100	4,100	200	16	110	173	MTBE = 2100 TBA = 910 ETBE = 6.4 TAME = 210	ALL ND
B3-00 1A	5/22/2000	1,600	16,000	97,000	14	1.2	1.3	3.5	MTBE = 41 MTBE = 5.7	ALL ND
B3-00 2A	5/22/2000	80	94	200	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 140 TAME = 5.7	ALL ND
B4-00 2A	5/24/2000	340.0	120.0	ND<170	1.9	ND<0.5	0.6	ND<0.5	MTBE = 0.58	ALL ND
B5-00 2A	5/25/2000	150.0	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 31	ALL ND
B6-00 1A	11/22/2000	6,500	470	ND<170	110	11	84	39	MTBE = 910 ETBE = 7.7 TAME = 9.1	1,2-Dichloro-ethane = 8.5
B6-00 2A	11/22/2000	740	93	220	2.9	ND<1.0	1.9	ND<1.0	MTBE = 130 TAME = 5.6 MTBE = 45	ALL ND
B7-00 1A	11/22/2000	1,900	53	ND<170	ND<2.5	ND<2.5	ND<2.5	ND<2.5	MTBE = 2200 TBA = 690	ALL ND
B7-00 2A	11/22/2000	500	82	240	ND<2.5	ND<2.5	ND<2.5	ND<2.5	MTBE = 350 TBA = 140	1,2-Dichloro-ethane = 7.0
B8-00 1A	11/22/2000	110	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 130 TAME = 5.6	ALL ND
B8-00 2A	11/22/2000	230	---	---	ND<1.0	ND<1.0	ND<1.0	ND<1.0	MTBE = 45	ALL ND
B9-00 1A	11/22/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	ALL ND
B9-00 2A	11/22/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 8.0	ALL ND
B10-00 2A	11/22/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 1.2	ALL ND
B11-00 1A	11/22/2000	180	52	910	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 9.6	ALL ND
B11-00 2A	11/27/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 4.4	ALL ND
B12-00 1A	11/28/2000	750	110	330	ND<0.5	ND<0.5	1.1	ND<0.5	MTBE = 0.78	ALL ND
B12-00 2A	11/28/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 4.3	ALL ND
B13-00 1A	11/27/2000	1,900	190	1,400	11	0.6	1.5	2	MTBE = 7.4	ALL ND
B13-00 2A	11/28/2000	430	290	1,300	5.7	ND<0.5	ND<0.5	ND<0.5	MTBE = 50	ALL ND
B14-00 1A	11/28/2000	1,400	97	ND<170	4.9	ND<0.5	0.7	2.2	MTBE = 350 TAME = 75	ALL ND
B14-00 2A	11/29/2000	950	90	ND<10	ND<1.0	ND<1.0	ND<1.0	ND<1.0	MTBE = 1500 TBA = 320 DIPE = 3.8 TAME = 7.2 ETBE = 10	ALL ND

TABLE 2: HISTORIC GROUNDWATER ANALYTICAL RESULTS

HPI / Fortuna Shell, 819 Main St, Fortuna, CA

LACO No. 4563.01; LOP No. 12672

Sample Number	Sample Date	TPHg ($\mu\text{g/l}$)	TPHd ($\mu\text{g/l}$)	TPHmo ($\mu\text{g/l}$)	Benzene ($\mu\text{g/l}$)	Toluene ($\mu\text{g/l}$)	Ethylbenzene ($\mu\text{g/l}$)	Xylenes ($\mu\text{g/l}$)	Fuel Oxygenates ($\mu\text{g/L}$)	Lead Scavengers ($\mu\text{g/l}$)
UST Closure, continued										
B15-00 1A	11/29/2000	860	76	ND<170	3.8	ND<0.5	ND<0.5	0.5	MTBE = 91 TBA = 38 TAME = 7.9 MTBE = 860 TBA = 250 DIPE = 3.1 ETBE = 7.4 TAME = 2.8	ALL ND
B15-00 2A	11/29/2000	410	59	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5		ALL ND
B16-00 1A	12/18/2000	ND<50	130	600	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
B16-00 2A	12/18/2000	ND<500	1,200	5,800	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ALL ND	---
B17-00 1A	12/18/2000	ND<50	ND<50	ND<170	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
B17-00 2A	12/19/2000	ND<50	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
B18-00 1A	12/19/2000	150	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 79 TBA = 16 TAME = 6.0 MTBE = 18	---
B18-00 2A	12/20/2000	270	---	---	ND<0.5	1	ND<0.5	ND<0.5	MTBE = 18	---
B19-00 1A	12/19/2000	ND<50	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
B19-00 2A	12/20/2000	1,400	---	---	ND<1.0	ND<1.0	ND<1.0	ND<1.0	MTBE = 740 TBA = 140 ETBE = 4.3 TAME = 2.7	---
B20-00 1A	12/20/2000	760	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 7.1	---
B20-00 2A	12/20/2000	480	---	---	ND<0.5	ND<0.5	ND<0.5	ND<0.5	MTBE = 290 TBA = 42 ETBE = 2.0	---
2001 Investigation										
HP-1	10/16/2001	210.0	---	---	5.1	ND<0.5	ND<0.5	ND<0.5	MTBE = 1.1 TBA = 75 DIPE=58	---
HP-2	10/16/2001	280.0	---	---	0.77	ND<0.5	ND<0.5	ND<0.5	MTBE = 0.99 TBA = 110 DIPE=64	---
HP-3	10/16/2001	ND<50	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
HP-4	10/16/2001	ND<50	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
HP-5	10/16/2001	ND<50	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ALL ND	---
HP-6	10/16/2001	Insufficient water to sample								
2004 Investigation										
4563-B12-W20-22	9/30/2004	ND<50	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-10	---
4563-B12-W23-25	9/30/2004	ND<50	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-10	---
4563-B13-W20-22	9/30/2004	ND<100	---	---	ND<1.0	ND<1.0	ND<1.0	ND<1.0	MTBE = 45 others ND<2.0-50	All
MW15	10/8/2004	2,400	---	---	77	3.6	32	17	TAME = 1.3 others ND<1.0-60	All
MW16	10/8/2004	6,700	---	---	400	19	65	90	MTBE = 410 TAME = 8.8 All others	---
MW17S	11/10/2004	64	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-80 MTBE = 33 others ND<1.0-35	All
MW17D	11/10/2004	ND<50	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	MTBE = 5.0 others ND<1.0 - 170	All

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
 Fortuna Shell, 819 Main St, Fortuna, California
 LACO Project No. 4563.01; LCP No. 12672

WELL Sample Date	Groundwater Measurements			Depth to Water (feet)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TBA (µg/L)	TAME (µg/L)	ETBE (µg/L)	DIPE (µg/L)	Other Analytes (µg/L)
	Well Head Elevation (feet NAVD 88)	Hydraulic Head (feet NAVD 88)	Screened Interval = 6-10 feet bgs														
MW-1	59.67			6.16	...	3,600	230	ND<170	42	5	27	...	20.1	500	ND>20	56	ND<1.0
8/4/2000	53.51			6.26	7.03	...	...	...	...	...	...	...	...	...	...	...	ND<1.0
8/7/2000	53.41			52.64	7.52	...	...	...	...	...	...	...	...	...	...	...	...
9/8/2000				52.15	7.52	...	...	...	...	...	...	...	...	...	...	...	...
10/12/2000				53.91	5.76	2,900	210	ND<170	9.2	1.4	8.1	5.5	250	120	27	ND<1.0	ND<1.0
11/3/2000				54.60	5.07	...	...	...	...	...	...	...	...	...	...	...	...
12/12/2000				54.83	4.84	...	...	...	...	...	...	...	...	...	...	...	...
1/8/2001				54.83	4.84	2,800	570	ND<170	23	2.4	12	4.8	74	ND>20	ND>2.0	ND>2.0	ND>2.0
2/6/2001				55.47	4.20	...	...	...	...	...	...	...	...	...	...	...	...
3/12/2001				54.87	4.80	...	...	...	...	...	...	...	...	...	...	...	...
4/20/2001				54.69	4.98	3,400	420	ND<200	37	3.9	19	7.52	120	ND>10	ND>1.0	ND>1.0	ND>1.0
5/8/2001				54.42	5.25	...	...	...	...	...	...	...	...	...	...	...	...
6/8/2001				53.59	5.98	...	...	...	...	...	...	...	...	...	...	...	...
7/16/2001				53.21	6.46	2,300	190	ND<170	25	3.6	18	9.42	130	ND>5.0	ND>1.0	ND>1.0	ND<1.0
8/7/2001				52.69	6.98	...	...	...	...	...	...	...	...	...	...	...	...
9/17/2001				52.15	7.52	...	...	...	...	...	...	...	...	...	...	...	...
10/24/2001				52.13	7.54	4,300	350	ND<170	25	2.2	15	7.5	94	53	9.2	ND>1.0	ND>1.0
11/6/2001				55.60	4.07	2,100	99	...	...	...	...	...	...	...	...	...	ND<1.0
2/5/2002				54.85	4.82	2,300	130	ND<170	18	2.6	16	8.5	20	25	2.6	ND<1.0	ND<1.0
5/9/2002				53.11	6.56	1,500	130	ND<170	6.6	1.2	7.3	8.4	9.9	ND<5.0	1.0	ND>1.0	ND<1.0
8/15/2002				56.52	3.15	410	ND>50	ND<170	ND<50	...	...	...	...	...	...	...	ND<1.0
12/20/2002				55.42	4.25	1,700	140	ND<170	13	4.6	17	4.8	15	ND>20	1.1	ND<1.0	ND<1.0
2/11/2003				54.79	4.88	320	ND>50	ND<170	3.1	1.5	5.9	2.4	1.8	ND>20	ND>1.0	ND>1.0	ND>1.0
5/13/2003				52.47	7.20	1,700	ND>50	ND<170	7.0	1.3	7.7	3.5	13	ND>20	1.4	ND<1.0	ND<1.0
8/14/2003				51.72	7.95	4,500	320	ND<170	31	3.8	17	12	ND>70	2.8	ND<1.0	ND<1.0	ND<1.0
11/4/2003				56.71	2.96	80	ND>50	ND<170	ND<50	ND>50	ND>50	ND>50	ND>50	ND<1.0	ND<1.0	ND<1.0	ND<1.0
2/2/2004				54.27	5.40	130	ND>50	ND<170	ND<50	ND>50	ND>50	ND>50	ND>50	ND<1.0	ND<1.0	ND<1.0	ND<1.0
5/4/2004				52.12	7.55	1,400	180	ND<170	4.7	0.87	3.7	1.5	ND>6.0	ND<10	ND<1.0	ND<1.0	ND<1.0
8/3/2004				54.27	5.40	61	ND>50	ND<170	ND>50	ND>50	ND>50	ND>50	ND>50	ND<10	ND<1.0	ND<1.0	ND<1.0
11/10/2004				55.07	4.60	4,60	ND>50	ND<170	ND>50	ND>50	ND>50	ND>50	ND>50	ND<10	ND<1.0	ND<1.0	ND<1.0
2/1/2005																	
MW-2	59.45			53.49	5.96	...	...	...	...	...	...	...	...	...	...	...	...
8/4/2000				53.45	6.00	8,000	330	ND<170	160	8.6	34	49	790	ND>50	82	ND>2.5	ND>2.5
8/7/2000				52.62	6.83	...	...	...	...	...	...	...	...	...	...	...	...
9/8/2000				52.12	7.33	...	...	...	...	...	...	...	...	...	...	...	...
10/12/2000				53.98	5.47	8,600	510	ND<170	130	6.2	25	32	680	420	86	ND>2.5	ND>2.5
11/3/2000				54.59	4.86	...	...	...	...	...	...	...	...	...	...	...	...
12/12/2000				54.87	4.58	...	...	...	...	...	...	...	...	...	...	...	...
1/8/2001				54.68	4.77	8,200	590	ND<170	150	9.6	39	40	310	ND>50	ND>5.0	ND>5.0	ND>5.0
2/6/2001				55.04	4.41	...	...	...	...	...	...	...	...	...	...	...	...
3/12/2001				54.91	4.54	...	...	...	...	...	...	...	...	...	...	...	...
4/20/2001				54.65	4.80	8,000	950	ND<200	110	6.9	30	32	280	ND>25	ND>2.5	ND>2.5	ND>2.5
5/8/2001				54.42	5.03	...	...	...	...	...	...	...	...	...	...	...	...
6/8/2001				53.75	5.70	...	...	...	...	...	...	...	...	...	...	...	...
7/16/2001				53.23	6.22	5,900	300	ND<170	47	4.5	17	19	180	ND>25	ND>2.5	ND>2.5	ND>2.5
8/7/2001				52.74	6.71	...	...	...	...	...	...	...	...	...	...	...	...
9/17/2001				52.25	7.20	...	...	...	...	...	...	...	...	...	...	...	...
10/24/2001				52.17	7.28	8,400	580	ND<170	100	8.7	33	33	160	ND>50	15	ND>5.0	ND>5.0

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
Fortuna Shell, 819 Main St, Fortuna, California
LACO Project No. 4563.01; LOP No. 12672

MW-2 Continued	2/5/2002	54.81	4.64	9,900	460	---	160	13	71	51	170	100	24	ND<3.0
	5/9/2002	50.84	8.61	7,800	360	ND<170	100	8.6	44	37	54	ND>30	6.1	ND<3.0
	8/15/2002	56.25	3.20	6,400	720	ND<170	110	11	42	44	65	ND>40	5.6	ND<4
	12/20/2002			5,200	330	ND<170	20	ND<5.0	18	16	ND>20	ND>200	ND<10	ND<10
														1.2-EDB=1.1 1.2-DCA=1.9
MW-2	2/11/2003	54.93	4.52	7,900	610	ND<170	100	10	50	49.3	ND<300	92	10	ND<1.0
	5/13/2003	55.39	4.06	6,200	600	ND<170	51	7.7	41	37.8	ND<100	ND>20	5.2	ND>1.0
	8/14/2003	52.40	7.05	9,400	810	ND<170	70	7.3	34	29.7	ND<180	31	7.6	ND<1.0
	11/4/2003	Well was inaccessible	---	---	---	---	---	---	---	---	---	---	---	---
	2/2/2004	56.17	3.28	5,900	730	ND<170	21	5.4	27	20.3	ND<14	ND<10	1.1	ND<1.0
	5/4/2004	54.20	5.25	7,000	500	ND<170	60	11	51	40	ND<45	ND>20	2.4	ND<1.0
	8/3/2004	52.13	7.32	7,300	740	ND<170	47	7.9	39	31.3	ND<36	ND>10	1.8	ND<1.0
	11/10/2004	54.14	5.31	6,300	980	ND<170	32	6.3	34	27.2	ND<15	ND>10	1.0	ND<1.0
	2/1/2005	55.03	4.42	7,600	220	ND<170	34	6.3	41	35.6	ND<10	ND>10	ND<1.0	ND<1.0
MW-3	59.25	Screened Interval = 5-12 feet bgs												
	8/4/2000	53.06	6.19	---	74	ND<170	4.3	ND<4.0	ND<4.0	5,600	2,500	550	---	---
	8/7/2000	53.11	6.14	2,300	---	---	---	---	---	---	---	---	---	---
	9/8/2000	52.58	6.67	---	---	---	---	---	---	---	---	---	---	---
	10/12/2000													
	11/3/2000	53.46	5.79	2,000	59	ND<170	ND<2.0	ND<2.0	ND<2.0	4,000	1,300	490	ND<5.0	ND<5.0
	12/12/2000	53.85	5.40	---	---	---	---	---	---	---	---	---	---	---
	1/8/2001	53.94	5.31	---	---	---	---	---	---	---	---	---	---	---
	2/6/2001	54.32	4.93	1,900	ND>50	ND<170	7.6	ND<5.0	ND<5.0	2,000	ND<100	200	ND<10	ND<10
	3/12/2001	53.70	5.55	---	---	---	---	---	---	---	---	---	---	---
	4/20/2001	54.23	5.02	---	---	---	---	---	---	---	---	---	---	---
	5/8/2001	53.92	5.33	1,200	56	ND<200	1.4	ND<1.3	ND<1.3	1100	270	130	ND<2.5	ND<2.5
	6/8/2001	53.68	5.57	---	---	---	---	---	---	---	---	---	---	---
	7/16/2001	53.16	6.09	---	---	---	---	---	---	---	---	---	---	---
	8/7/2001	52.95	6.30	740	ND>50	ND<170	5.1	ND<1.3	ND<1.3	970	200	94	ND<2.5	ND<2.5
	9/17/2001	52.75	6.50	---	---	---	---	---	---	---	---	---	---	---
	10/24/2001	52.22	7.03	---	---	---	---	---	---	---	---	---	---	---
	11/6/2001	51.92	7.33	880	ND>50	ND<170	1.5	ND<1.0	ND<1.0	1,100	160	99	ND<2.0	ND<2.0
	2/5/2002	54.58	4.67	600	ND>50	---	0.74	ND<0.50	ND<0.50	740	310	86	2.2	ND<1.0
	5/9/2002	54.23	5.02	920	ND>50	ND<170	5.3	ND<0.50	0.81	ND<0.50	470	100	40	ND<1.0
	8/15/2002	52.96	6.29	590	71	ND<170	6.3	0.56	0.95	1.8	420	150	30	1.1
	12/20/2002	54.97	4.28	99	ND>50	ND<170	0.90	ND<0.50	ND<0.50	0.59	91	ND>70	4	ND<1.0
	2/11/2003	54.54	4.71	740	ND>50	ND<170	2.8	1.1	ND<0.50	5.06	720	300	57	ND<1.0
	5/13/2003	54.96	4.29	1,300	220	ND<170	25.0	4.3	1.2	22.9	680	300	60	ND<1.0
	8/14/2003	52.36	6.89	820	95	ND<170	3.4	0.7	ND<0.50	3.9	1,000	180	73	ND<1.0
	11/4/2003	51.79	7.46	650	ND>50	ND<170	ND>50	ND>50	ND>50	1.54	940	65	1.2	ND<1.0
	2/2/2004	55.27	3.98	3,600	490	ND<170	26	1.4	0.81	6.4	180	79	15	ND<1.0
	5/4/2004	53.84	5.41	2,200	310	ND<170	4.6	1.0	ND<0.50	2.58	81	ND>40	5.3	ND<1.0
	8/3/2004	52.06	7.19	960	140	ND<170	0.68	ND<0.50	ND<0.50	1.32	220	42	14	ND<1.0
	11/10/2004	53.31	5.94	910	190	ND<170	ND>50	ND>50	ND>50	ND>50	290	19	ND<1.0	ND<1.0
	2/17/2005	54.46	4.79	2,900	460	ND<170	8.4	0.89	0.56	3.5	44	ND>30	3.1	ND<1.0

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS

Fortuna Shell, 819 Main St, Fortuna, California
LACO Project No. 4563.01; LCP No. 12672

MW-4	59.96	Screened Interval = 5-10 feet bgs	8/4/2000	53.73	6.23	---	---	---	---	---	---	---	---	---	---	---	---	45	ND>1.0	ND<1.0	---		
8/7/2000	6.29	11,000	53.0	ND<170	900	32	69	159	620	---	---	---	---	---	---	---	45	ND>1.0	ND<1.0	---			
9/8/2000	7.11	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
10/12/2000	7.63	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
11/3/2000	6,400	6.09	ND<170	600	20	80	82.5	180	ND<100	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0								
12/12/2000	5.29	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
1/8/2001	54.72	5.24	---	---	---	47	38	140	ND<100	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10								
2/6/2001	4.75	5,400	550	ND<170	540	12	47	38	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
3/12/2001	4.52	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
4/20/2001	4.75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5/8/2001	5.00	6,200	920	ND<200	620	24	120	76.2	ND>50	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0								
6/8/2001	54.84	5.12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7/16/2001	54.04	5.92	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
8/7/2001	53.43	6.53	5,900	520	570	660	26	130	98.8	190	ND<100	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	
9/17/2001	52.96	7.00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
10/24/2001	52.39	7.57	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
11/6/2001	52.36	7.60	7,200	200	ND<170	670	30	100	77	120	ND<100	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	
2/5/2002	55.56	4.40	4,800	83	---	340	14	48	27	100	32	5.8	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.0
5/9/2002	4.49	3,800	260	ND<170	300	19	74	48.6	52	ND>30	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	ND>3.0	
8/15/2002	5.89	4,700	280	ND<170	350	21	82	46.7	81	ND>50	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	
12/20/2002	55.80	4.16	6,900	260	ND<170	430	32	97	52	ND<150	ND<1000	500	230	28	1.1	1.2-DCA=1.3							
2/11/2003	55.58	4.38	5,700	64	ND<170	430	24	57	55.9	500	ND>200	47	8.1	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
5/13/2003	54.91	5.05	5,500	500	ND<170	360	27	85	65.7	ND>200	47	8.1	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
8/14/2003	52.90	7.06	7,400	440	ND<170	480	22	79	47.4	120	51	5.6	1.1	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
11/4/2003	52.01	7.95	10,000	700	ND<170	600	35	110	71.8	ND<150	ND>20	4.4	ND<1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
2/2/2004	56.19	3.77	8,400	740	ND<170	450	27	85	63	ND<150	ND>50	4.6	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
5/4/2004	54.77	5.19	3,500	120	ND<170	74	8.5	26	27.1	ND>80	ND>50	2.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0
8/3/2004	52.65	7.31	420	ND>50	ND>50	4.3	0.66	2.1	1.9	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0							
11/10/2004	54.16	5.80	190	ND>50	ND>50	1.1	ND>0.50	0.95	0.99	ND>2.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	ND>1.0	
2/1/2005	55.48	4.48	170	ND>50	ND>50	0.71	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>0.50										
MW-5	59.47	Screened Interval = 5-10 feet bgs	8/4/2000	53.10	6.37	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2000	53.31	6.16	23,000	1,900	ND<170	3,600	61	590	1,556	4,500	ND>500	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5
9/8/2000	53.02	6.45	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10/12/2000	52.47	7.00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11/3/2000	53.59	5.88	17,000	1,200	930	2,500	60	800	940	2,300	ND>500	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5
12/12/2000	54.28	5.19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1/8/2001	54.26	5.21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2/6/2001	54.45	5.02	17,000	890	ND<170	2,600	49	370	320	2,300	ND>500	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50
3/12/2001	54.83	4.64	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/20/2001	54.76	4.71	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/8/2001	54.56	4.91	14,000	1,300	ND>200	2,300	48	510	555	1,700	ND>500	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5
6/8/2001	54.45	5.02	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/16/2001	53.68	5.79	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2001	53.33	6.14	14,000	1,100	330	2,200	52	390	420	2,000	ND>250	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25	ND>25
9/17/2001	52.98	6.49	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10/24/2001	52.48	6.99	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
Fortuna Shell, 819 Main St, Fortuna, California
LACO Project No. 4563.01; LOP No. 12672

MW-5, Continued	11/6/2001	52.34	7.13	20,000	1,100	420	2,500	48	550	493	2,300	550	21	ND<20	ND>20
2/5/2002	55.26	4.21	15,000	660	---	2,100	42	390	391	2,200	890	48	ND<20	ND<20	
5/9/2002	54.76	4.71	10,000	810	210	1,400	33	260	270	790	ND<200	21	ND<20	ND<20	
8/15/2002	53.68	5.79	13,000	1,300	960	1,200	33	210	280	910	ND<200	24	ND<20	ND<20	
12/20/2002	55.23	4.24	40,000	6,900	13,000	1,800	51	460	380	ND<1800	ND<1000	ND<50	ND<50	ND<50	1,2-DCA= π 1.7
2/11/2003	56.06	3.41	13,000	880	1,200	1,500	34	200	239.7	710	230	25	3.5	ND<1.0	1,2-EDB= π 1.0
5/13/2003	54.79	4.68	13,000	1,100	1,100	1,000	33	230	230	590	ND<1000	ND<50	ND<50	ND<50	ND<50
8/14/2003	53.09	6.38	18,000	1,500	610	1,700	44	340	240	760	ND<1000	ND<50	ND<50	ND<50	ND<50
11/4/2003	52.25	7.22	52,000	37,000	56,000	1,500	33	340	259.4	ND<1200	ND<200	17	ND<10	ND<10	1,2-DCA= π 2.3
2/2/2004	56.17	3.30	19,000	2,200	300	1,300	29	240	208.1	680	99	16	ND<5.5	ND<1.0	ND<1.0
5/4/2004	54.59	4.88	31,000	6,500	5,100	1,500	37	310	217.4	ND<1000	82	14	2.3	ND<10	ND<10
8/3/2004	52.92	6.55	21,000	2,900	1,600	32	220	160	530	ND<500	ND<50	ND<50	ND<50	ND<50	ND<50
11/10/2004	54.14	5.33	140,000	25,000	12,000	830	20	50	401	ND<850	59	8	2	ND<1.0	ND<1.0
2/1/2005	54.86	4.61	23,000	6,000	3,200	910	24	130	134.1	400	34	8.1	1.4	ND<1.0	ND<1.0
MW-6	60.06	Screened Interval = 12-20 feet bgs													
8/4/2000	52.86	7.20	---	---	---	2.6	ND<2.5	1.1	1.9	820	---	---	---	5.4	3.0
8/7/2000	52.14	7.92	1,200	140	ND<170	2.6	---	---	---	---	---	---	---	---	---
9/8/2000	51.64	8.42	---	---	---	---	---	---	---	---	---	---	---	---	---
10/12/2000	50.96	9.10	---	---	---	1.6	ND<0.5	0.65	900	130	10	8.8	5.0	1,2 DCA= π 8.5	
11/3/2000	51.51	8.55	670	ND>50	ND<170	---	---	---	---	---	---	---	---	---	---
12/2/2000	53.24	6.82	---	---	---	---	---	---	---	---	---	---	---	---	---
1/8/2001	52.99	7.07	---	---	---	ND<2.5	ND<2.5	---	---	---	---	---	---	---	---
2/6/2001	53.55	6.51	900	ND>50	ND<170	ND>2.5	ND<2.5	ND<2.5	ND<2.5	1,200	ND<50	35	7.8	ND<5.0	1,2 DCA= π 7.3
3/12/2001	52.75	7.31	---	---	---	---	---	---	---	---	---	---	---	---	---
4/20/2001	55.35	4.71	---	---	---	---	---	---	---	---	---	---	---	---	---
5/8/2001	52.49	7.57	570	51	ND>200	1.5	ND<2.5	ND<2.5	ND<2.5	860	68	37	5.0	ND<2.5	1,2 DCA= π 4.6
6/8/2001	52.34	7.72	---	---	---	---	---	---	---	---	---	---	---	---	---
7/16/2001	52.24	7.82	---	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2001	51.91	8.15	680	ND>50	ND<170	ND<1.3	ND<1.3	ND<1.3	ND<1.3	1,100	200	38	6.4	2.6	1,2 DCA= π 4.9
9/17/2001	51.59	8.47	---	---	---	---	---	---	---	---	---	---	---	---	---
10/24/2001	51.06	9.00	---	---	---	---	---	---	---	---	---	---	---	---	---
11/6/2001	50.84	9.22	750	ND>50	ND<170	ND<1.0	ND<1.0	ND<1.0	ND<1.0	910	150	35	4.9	2.1	1,2 DCA= π 3.9
2/5/2002	54.17	5.89	710	ND>50	---	ND<1.0	ND<1.0	ND<1.0	ND<1.0	1,300	350	92	7.8	3.1	Pb Saty= π 3.7
5/9/2002	53.79	6.27	630	ND>50	---	ND<1.5	ND<1.5	ND<1.5	ND<1.5	1,100	160	54	3.5	ND<3.0	Pb Saty= π 3.5
8/15/2002	52.88	7.18	930	ND>50	ND<170	ND<1.0	ND<1.0	ND<1.0	ND<1.0	1,7	980	160	54	5.1	2.3
12/20/2002	54.47	5.59	910	ND>50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1,200	480	64	4.9	2.7	1,2-DCA= π 4.0
2/11/2003	54.39	5.67	1,100	ND>50	ND<170	0.58	ND<0.50	ND<0.50	ND<0.50	1,300	450	74	5.2	ND<4.0	1,2-DCA= π 3.6
5/13/2003	54.53	5.53	380	ND>50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	960	180	62	3.6	1.5	1,2-DCA= π 3.1
8/14/2003	51.35	8.71	720	ND>50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1,000	210	72	4.8	2.1	1,2-DCA= π 2.4
11/4/2003	49.54	10.52	670	ND>50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1,000	190	58	3.5	1.7	1,2-DCA= π 2.3
2/2/2004	53.95	6.14	1,100	ND>50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1,100	270	64	ND>3.0	2.0	

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
 Fortuna Shell, 819 Main St, Fortuna, California
 LACO Project No. 4563.01; LOP No. 12672

MW-6 Continued

	52.16	7.90	450	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	480	55	29	1.8	ND<1.0
8/3/2004	50.44	9.62	160	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	180	ND<22	6.9	ND<1.0	ND<1.0
11/10/2004	51.64	8.42	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	30	ND<10	ND<1.0	ND<1.0	ND<1.0
2/1/2005	54.72	5.34	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	21	ND<10	ND<1.0	ND<1.0	ND<1.0
MW-7		59.80	Screened Interval = 10-15 feet bgs											
8/4/2000	53.63	6.17	---	---	---	---	---	---	---	67.4	3,000	700	220	---
8/7/2000	53.60	6.20	3,700	190	ND<170	3.3	2.8	2	---	---	---	---	---	---
9/8/2000	52.97	6.83	---	---	---	---	---	---	---	---	---	---	---	---
10/12/2000	52.35	7.45	---	---	---	---	---	---	---	---	---	---	---	---
11/3/2000	53.50	6.30	910	110	ND<170	2.2	ND<1.0	1.2	1.9	1,200	280	90	4.2	ND<2.5
12/12/2000	53.78	6.02	---	---	---	---	---	---	---	---	---	---	---	---
1/8/2001	54.13	5.67	---	---	---	---	---	---	---	---	---	---	---	---
2/6/2001	54.39	5.41	1,700	170	280	5.2	ND<5.0	ND<5.0	ND<5.0	1,800	440	160	ND<10	ND<10
3/12/2001	54.73	5.07	---	---	---	---	---	---	---	---	---	---	---	---
4/20/2001	54.61	5.19	---	---	---	---	---	---	---	---	---	---	---	---
5/8/2001	54.39	5.41	1,100	160	ND<200	6.6	ND<5.0	ND<5.0	ND<5.0	2,000	450	200	ND<5.0	ND<5.0
6/8/2001	54.17	5.63	---	---	---	---	---	---	---	---	---	---	---	---
7/16/2001	54.00	5.80	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2001	53.70	6.10	1,400	ND<50	ND<170	8.3	ND<5.0	ND<5.0	ND<5.0	2,100	670	180	ND<10	ND<10
9/17/2001	53.39	6.41	---	---	---	---	---	---	---	---	---	---	---	---
10/24/2001	52.85	6.95	---	---	---	---	---	---	---	---	---	---	---	---
11/6/2001	52.63	7.17	1,400	ND<50	ND<170	ND<1.5	ND<1.5	ND<1.5	ND<1.5	1,800	430	150	4.6	ND<3.0
5/5/2002	55.40	4.40	1,500	ND<50	---	31	ND<1.5	ND<1.5	ND<1.5	2,000	750	190	7.9	3.8
5/9/2002	54.88	4.92	1,100	ND<50	ND<170	51	ND<2.5	ND<2.5	ND<2.5	1,800	280	96	ND<5.0	ND<5.0
8/15/2002	53.06	6.74	1,500	ND<50	ND<170	4.6	ND<1.5	ND<1.5	ND<1.5	2.6	1,500	290	110	5.3
12/20/2002	55.83	3.97	750	ND<50	ND<170	0.64	ND<0.50	ND<0.50	ND<0.50	0.57	1,200	510	78	3.4
2/11/2003	55.32	4.48	1,400	ND<50	ND<170	36	0.69	0.74	0.61	1,300	550	78	ND<8.0	ND<4.0
5/13/2003	53.78	6.02	620	ND<50	ND<170	18	0.64	0.79	1.21	1,000	190	64	3.4	1.9
8/14/2003	52.90	6.90	830	54	ND<170	1.4	ND<0.50	ND<0.50	ND<0.50	1,100	250	85	4.0	1.1
11/14/2003	52.04	7.76	570	ND<50	ND<170	1.4	ND<0.50	ND<0.50	ND<0.50	780	140	48	2.7	ND<1.0
2/2/2004	55.82	3.98	1,300	50	ND<170	7.6	ND<0.50	0.56	ND<0.50	1,200	240	69	4.6	ND<4.5
5/4/2004	54.43	5.37	860	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	870	ND<50	67	2.8	ND<1.0
8/3/2004	52.23	7.57	710	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	720	42	48	2.4	ND<1.0
11/10/2004	53.67	6.13	ND<50	56	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<10	ND<10	ND<1.0	ND<1.0	ND<1.0
2/1/2005	55.24	4.56	140	ND<50	ND<170	0.66	ND<0.50	ND<0.50	ND<0.50	130	ND<10	5.3	ND<1.0	ND<1.0
MW-8		59.58	Screened Interval = 15-20 feet bgs											
8/4/2000	52.05	7.53	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2000	50.81	8.77	4,800	98	ND<170	ND<10	ND<10	ND<10	ND<10	11,000	2,100	36	54	1,2 DCA=42
9/8/2000	51.60	7.98	---	---	---	---	---	---	---	---	---	---	---	---
10/12/2000	51.17	8.41	---	---	---	---	---	---	---	---	---	---	---	---
11/3/2000	52.58	7.00	3,200	65	ND<170	ND<4.0	ND<4.0	ND<4.0	ND<4.0	7,800	1,300	50	56	ND<10
12/12/2000	52.82	6.76	---	---	---	---	---	---	---	---	---	---	---	---
1/8/2001	52.77	6.81	---	---	---	---	---	---	---	---	---	---	---	---
2/6/2001	53.29	6.29	5,700	ND<50	ND<170	ND<10	ND<10	ND<10	ND<10	8,000	1,100	61	47	ND<20
3/12/2001	53.66	5.92	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
Fortuna Shell, 819 Main St, Fortuna, California
LACO Project No. 4563.01; LCP No. 12672

MW-8 Continued											
4/20/2001	53.26	6.32	ND<50	ND<200	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3	ND<6.3
5/8/2001	52.85	6.73	4,600	ND	ND	ND	ND	ND	ND	6,900	620
6/8/2001	52.70	6.88	ND	ND	ND	ND	ND	ND	ND	ND	83
7/16/2001	52.58	7.00	ND	ND	ND	ND	ND	ND	ND	ND	ND
8/7/2001	51.61	7.97	4,700	ND<50	ND<170	ND<13	ND<13	ND<13	ND<13	7,600	ND<250
9/17/2001	50.80	8.78	ND	ND	ND	ND	ND	ND	ND	ND	ND
10/24/2001	50.28	9.30	ND	ND	ND	ND	ND	ND	ND	ND	ND
11/6/2001	50.68	8.90	4,800	ND<50	ND<170	ND<10	ND<10	ND<10	ND<10	7,000	920
2/5/2002	53.62	5.96	2,600	ND<50	ND	ND<5.0	ND<5.0	ND<5.0	ND<5.0	6,200	860
5/9/2002	53.05	6.53	2,800	ND<50	ND<170	ND<5.0	ND<5.0	ND<5.0	ND<5.0	6,500	850
8/15/2002	52.25	7.33	4,400	ND<50	ND<170	ND<5.0	ND<5.0	ND<5.0	ND<5.0	5,600	820
12/20/2002	53.52	6.06	3,100	ND<50	ND<170	0.63	ND<0.50	ND<0.50	ND<0.50	5,700	ND<6000
2/11/2003	54.41	5.17	4,500	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	6,200	1,800
5/13/2003	53.56	6.02	950	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4,500	1,100
8/14/2003	50.53	9.05	1,300	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4,600	1,100
11/4/2003	50.70	8.88	1,500	ND<50	ND<170	1.5	ND<0.50	0.51	ND<0.50	4,700	1,100
2/2/2004	53.82	5.76	4,200	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4,700	1,000
5/4/2004	52.56	7.02	2,900	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4,300	1,100
8/3/2004	49.60	9.98	3,000	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4,100	920
11/10/2004	49.26	10.32	3,100	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3,500	810
2/1/2005	49.74	9.84	2,600	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3,500	640
MW-9											
Screened Interval = 12.5-15.5 feet bgs											
11/6/2001	46.34	13.01	160	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	210	ND<5.0
2/5/2002	52.11	7.24	92	ND<50	ND	ND<0.50	ND<0.50	ND<0.50	ND<0.50	210	ND<5.0
5/9/2002	49.62	9.73	88	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	180	ND<5.0
8/15/2002	49.90	9.45	100	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.8	ND<5.0
12/20/2002	51.46	7.89	ND<50	ND	ND	ND<0.50	ND<0.50	ND<0.50	ND<0.50	30	ND<5.0
2/11/2003	53.66	5.69	51	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	29	ND<20
5/13/2003	52.43	6.92	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	10	ND<20
8/14/2003	49.68	9.67	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	12	ND<20
11/4/2003	49.12	10.23	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	21	1.1
2/2/2004	52.79	6.56	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.5	ND<1.0
5/4/2004	51.06	8.29	76	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	10	ND<10
8/3/2004	49.48	9.87	65	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	7.8	ND<10
11/10/2004	50.28	9.07	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	5.1	ND<10
2/1/2005	51.69	7.66	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	6.8	ND<10
MW-10											
Screened Interval = 12.5-15.5 feet bgs											
11/6/2001	48.64	10.55	61	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	82	17
2/5/2002	52.12	7.07	55	ND<50	ND	ND<0.50	ND<0.50	ND<0.50	ND<0.50	21	2.9
5/9/2002	51.17	8.02	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	34	ND<1.0
8/15/2002	48.04	11.15	87	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	41	ND<1.0
12/20/2002	51.68	7.51	53	190	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	63	ND<20
2/11/2003	45.71	13.48	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	44	ND<20
5/13/2003	48.49	10.70	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	15	ND<20
8/14/2003	47.55	11.64	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	38	ND<20
MW-10 Continued											
11/4/2003	46.54	12.65	ND<50	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	45	ND<20
2/2/2004	48.11	11.08	86	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	52	ND<1.0
5/4/2004	47.69	11.50	ND<50	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	15	ND<1.0
8/3/2004	46.27	12.92	ND<50	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	17	ND<1.0
11/10/2004	46.58	12.61	ND<50	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	28	ND<10
2/1/2005	50.36	8.83	ND<50	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	11	ND<1.0

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
 Fortuna Shell, 819 Main St, Fortuna, California
 LACO Project No. 4563.01; LCP No. 12672

MW-11	59.21	Screened Interval = 12.5-15.5 feet bgs
11/6/2001	47.85	11.36
2/5/2002	50.97	8.24
5/9/2002	8.76	ND>50
8/15/2002	11.21	ND>50
12/20/2002	51.92	7.29
2/11/2003	50.79	8.42
5/13/2003	51.24	7.97
8/14/2003	48.11	11.19
11/4/2003	45.99	13.22
2/2/2004	51.18	8.03
5/4/2004	50.04	9.17
8/3/2004	47.41	11.80
11/1/2004	49.59	9.62
2/1/2005	50.38	8.83

MW-12	59.09	Screened Interval = 12.5-15 feet bgs
11/6/2001	48.05	11.04
2/5/2002	50.67	8.42
5/9/2002	10.12	1,300
8/15/2002	1,800	ND>50
12/20/2002	52.42	6.67
2/11/2003	Well was inaccessible	---
5/13/2003	51.41	7.68
8/14/2003	48.71	10.38
11/4/2003	48.20	8.40
2/2/2004	51.69	7.40
5/4/2004	50.28	8.81
8/3/2004	48.34	10.75
11/1/2004	49.78	9.31
2/1/2005	50.58	8.51

MW-13	58.86	Screened Interval = 12.5-15 feet bgs
11/6/2001	48.82	10.04
2/5/2002	51.58	7.28
5/9/2002	Well was inaccessible	---
8/15/2002	51.01	7.85
12/20/2002	53.68	5.18
2/11/2003	Well was inaccessible	---
5/13/2003	52.06	6.80
8/14/2003	49.48	9.38
11/4/2003	49.12	9.74
2/2/2004	52.09	6.77
5/4/2004	50.89	7.97

MW-13 Continued	61.04	Screened Interval = 5-10 feet bgs
8/3/2004	49.13	9.73
11/10/2004	50.52	8.34
2/1/2005	51.10	7.76
11/10/2004	53.89	7.15
2/1/2005	55.76	5.28

TABLE 3: WELL DATA AND GROUNDWATER ANALYTICAL RESULTS
Fortuna Shell, 819 Main St, Fortuna, California
LACO Project No. 4563.01; LCP No. 12672

MW-15	60.80	Screened Interval = 5-10 feet bgs		90	ND<170	97	2.7	15	6.3	70	ND>40	2.6	ND<1.0	ND<1.0
		54.37	6.43											
MW-16	60.24	Screened Interval = 5-10 feet bgs		1,600	1,100	120	ND<170	40	1.4	8.9	3.4	ND<30	ND<10	ND<1.0
		56.34	4.46	56,340	5,680	340	ND<170	580	16	31	40.8	490	25	13
MW-17S	56.96	Screened Interval = 22.5-24.5 feet bgs		3,900	200	ND<170	480	13	22	31.9	500	61	12	5.2
		54.45	5.79	35,70	21,26	64	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	33	ND>35	ND<1.0
MW-17D	56.95	Screened Interval = 26-28 feet bgs		70	ND<190	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	ND<1.0	ND<1.0
		34.71	22.25	180	70	ND<170	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	180	ND>50	ND<1.0
MW-17D	56.95	Screened Interval = 26-28 feet bgs		24.53	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<20	ND<1.0	ND<1.0
		32.76	24.19	120	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	110	55	ND<1.0
Field Duplicate		Screened Interval = 5-10 feet bgs		ND<1.0		ND<1.0		ND<1.0		ND<1.0		ND<1.0		
8/7/01 (MW-5)	---	---	14,000	---	---	2,100	52	350	434	2,000	---	---	---	---
11/6/01 (MW-5)	---	---	20,900	---	---	2,500	46	520	462	2,200	510	22	---	---
2/5/02 (MW-2)	---	---	8,900	---	---	150	11	56	39	180	100	23	---	---
5/9/2002 (MW-5)	---	---	19,000	---	---	11,400	33	280	250	780	21	21	---	---
8/15/2002 (MW-10)	---	---	67	---	---	ND<0.50	ND<0.50	0.90	2.2	38	1,7	1,7	---	---
12/20/02 (MW-11)	---	---	ND<50	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1,4	1,5	---	---
2/11/03 (MW-10)	---	---	50	---	---	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	47	1,1	ND<1.0	ND<1.0
8/14/03 (MW-4)	---	---	7,100	---	---	450	23	81	47.5	120	28	5.7	2.8	1,2-DCA=2.4
11/4/03 (MW-8)	---	---	1,500	---	---	1.5	ND<0.50	0.53	ND<0.50	4,600	1,200	130	20	ND<1.0

NOTES:

TPHg - total petroleum hydrocarbons as gasoline

TPHD - total petroleum hydrocarbons as diesel

TPHmo - total petroleum hydrocarbons as motor oil

xylenes = sum of m/p/xylene and o-xylene

MTBE - methyl tertiary butyl ether

Other Analyses include the fuel oxygenates and lead scavengers.

TAME - tertiary amyl methyl ether

TBA - tertiary butyl alcohol

DPE - di-isopropyl ether

ETBE - ethyl tertiary butyl ether

Methanol, ethanol

1,2-dichlorobenzene

1,3-dichlorobenzene

1,4-dichlorobenzene

1,2-dichloroethane (1,2 DCA)

Ethyleneglycol (EDB)

--- sample not analyzed for parameter

ND<50 - non-detect at reporting limits shown

Bold results indicate analyte detection

Attachment 1

LACO ASSOCIATES
STANDARD OPERATING PROCEDURE No. 1 (revised September 2002)
Hazardous Materials Investigation Procedures

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SCOPE

Standard Operating Procedures (SOP) No.1 is for the implementation of hazardous material investigation procedures including pre-site activities, field methodologies, and post-field work activities. Monitoring well sampling is covered in SOP No.2. SOP No.1 will be used by HAZWOPER-certified personnel in conjunction with the drilling file provided by the Project Manager to complete the required tasks in a consistent and standardized manner. Each section covers a specific task. Where multiple tasks are involved, refer to the appropriate section(s).

SOP No.1 will be reviewed annually through a systematic evaluation by Environmental Department personnel. If revised, an updated SOP will be published and forwarded to the appropriate regulatory agencies and personnel by January 31 of each new year.

PREPARATION AND COMPLETION

Pre-field Activities

The Project Manager will initiate the project by starting a drilling file, which ensures all pre and post drilling tasks are completed and details the proposed field activities (Attachment 1). The purpose of the drilling file is to facilitate efficient transfer of information and responsibility from the Project Manager (PM) to the Field Geologist and back to the PM upon completion of work. The drilling file will include the following information:

1. Copies of the workplan, approval letter, access agreements, and encroachment and drilling permits
2. USA and owner/tenant clearances
3. Order of work
4. List of supplies necessary for the installation
5. Timeline, budget, and allocation of resources
6. Site safety and health plan specifying personal protection equipment (PPE) anticipated for the project

The Project Manager establishes and ensures task due dates are met. The Field Geologist will direct the order of work and is ultimately responsible for the collection and recording of all field data.

Mobilization and Site Arrival

Mobilization and site arrival covers the assembling of equipment and crew necessary for a particular project through implementation of the workplan at the project site.

1. Verify that equipment and supplies are present. Load drill rig or Geoprobe as applicable
2. Travel to site and notify site owner/operator of start of work
3. Field Geologist will hold tailgate safety meeting and complete a Field Safety Meeting form (Attachment 2)
4. Set up orange cones and “Closed Sidewalk” signs, as appropriate, and secure work area
5. Establish decontamination station, as appropriate

The Field Geologist is responsible for briefing the crew on relevant safety measures during the tailgate safety meeting. This shall take place on the first day of a project, whenever safety conditions change, when new crew members start work on the project, and at intervals of 10 days for long-term continuous projects.

Demobilization

Demobilization consists primarily of returning the drill rig, Geoprobe, support vehicle, and any other equipment used in the course of a project back to pre-implementation condition. The Laboratory Manager or Vice President of Operations shall be notified of any non-disposable equipment lost or damaged during a project. Post implementation elements of the drilling file shall be completed by the Field Geologist and returned to the Project Manager when fieldwork for that phase of the project has been completed. The following shall be added to the drilling file prior to returning it to the Project Manager:

1. Boring and well construction logs
2. Field notes and drawings
3. Equipment and supply billing forms
4. Completed chain-of-custody for analytical laboratory samples
5. Brief written summary of work performed
6. Two copies of the Field Safety Meeting forms; original to the safety officer and one copy to the Project Manager

GENERAL METHODOLOGIES – DRILLING

The following descriptions of work methods cover general tasks associated with drilling and sample collection.

Decontamination

The majority of projects will not require the use of multiple decontamination zones. Separate wash and rinse tubs are adequate for most projects. The Project Manager will indicate in the order of work section of the drilling file if additional decontamination is required.

Sampling equipment will be decontaminated using an Alconox detergent spray with a clean water rinse. Drill bits and rods, augers, and rig tools shall be pressure washed, steam cleaned, or scrubbed with the Alconox and rinsed before and after use. Alconox and clean rinse water will be pumped through each low flow submersible pump prior to its use. Down-hole equipment shall never be lubricated with petroleum-based lubricants.

Waste Storage and Characterization

Storage

1. Soil cuttings will be immediately secured in DOT-approved 55-gallon steel drums, sealed, and marked according to contents, boring of origin, and date of first accumulation, or may be added to an existing stockpile as approved by the Project Manager.
2. Purge water and equipment rinsate will be immediately secured in DOT-approved 55-gallon steel drums, sealed, and marked according to contents, boring of origin, and date of first accumulation.
3. Soil and water storage drums shall only be stored on-site, in a secure location provided by the client.
4. Free-phase gasoline or other hazardous material will be double contained in accordance with 40 CFR 264.175 (1993) in a secure location on-site, provided by the client.
5. Storage of soil known or suspected to qualify as designated or hazardous waste shall conform to the requirements of the Oversight Agency. At a minimum, soil shall be stockpiled on 10-mil PVC sheeting and shall be securely covered with 10-mil sheeting during wet weather periods.

Characterization

Characterization samples will be collected from each drum of wastewater, with methods appropriate for the necessary tests. Samples will be collected using a disposable bailer from the center of the water in the drum.

Samples from soil drums shall be composited by the laboratory in a ratio of 4 drums per 1 sample for analysis. Samples will be collected out of the approximate center of the soil in the drum. However, sampling technique will depend on the required analyses.

Borehole Logging

A complete log will be maintained when soils are encountered during drilling operations (Attachment 3). A State of California Registered Geologist will review the completed log. Soils will be classified in accordance with ASTM D-2488 (Standard Practice for Description and Identification of Soils [Visual-Manual Procedure]). The Field Geologist will record the following data in the log:

1. Based on auger cuttings or soil samples, record visual-manual estimate of grain size percentages (sand, gravel, silt, clay) and describe the soil texture according ASTM D-2488.
2. Record color (Munsell), moisture, density, plasticity, and percent organics.
3. Note any hydrocarbon odor, staining, or sheen.
4. Record depth(s) to saturated soil(s).
5. Record Photoionization Detector (PID) results from bagged grab samples, if applicable.
6. If collecting samples by split-spoon, record SPT blow counts for every 0.5-foot penetration of the split-spoon sampler, driven by a standard 140-pound weight falling a standard distance.
7. Sampling depth(s) and methodologies.
8. Identify samples by sample ID (project number-boring number-depth-matrix), field point name (project number-boring number), and date.
9. Record monitoring well construction specifications or closure date and sealing material(s) for temporary borings.

SAMPLE COLLECTION AND HANDLING

Refer to the Workplan and drilling file for the analytical suite, and to the laboratory for appropriate sample containers.

Surface Water

1. Submerge a clean stainless steel dipper (or other suitable device) with minimal surface disturbance, allow the device to fill slowly and continuously, and retrieve the dipper/device from the surface water with minimal disturbance.
2. Remove the cap from the appropriate sample bottle provided by the laboratory and slightly tilt the mouth of the bottle below the dipper/device edge. Empty the dipper/device slowly, allowing the sample stream to flow gently down the inside of the bottle with minimal entry turbulence. Check that a Teflon septum is present in the cap, if required. Secure the cap tightly. When filling VOAs, ensure that no air is trapped inside the bottle by inverting and tapping. If any bubbles are observed, repeat the procedure.
3. Label the sample bottle with an appropriate sample tag. Be sure to label the tag carefully, legibly and clearly, addressing all the categories. Record sample information in field notes and complete a chain-of-custody form (Attachment 4).
4. Place the properly labeled sample bottle in a cooler maintained at 4°C throughout the sampling and transportation period.

Groundwater

General procedures to be followed for sampling groundwater from a cased boring or hydropunch or screen point sampler:

1. Slowly lower bailer or pump into casing, do not drop.
2. Allow bailer or pump to fill.
3. Retrieve bailer or begin pumping.
4. Remove the cap from the appropriate sample bottle provided by the laboratory and slightly tilt the mouth of the bottle below the bailer or pump outlet. Fill the sample container slowly, allowing the sample stream to flow gently down the side of the bottle with minimal entry turbulence. Check that a Teflon septum is present in the cap, if required. Secure the cap tightly. When filling VOAs, ensure that no air is trapped inside the bottle by inverting and tapping. If any bubbles are observed, repeat the procedure.
5. Place the properly labeled sample bottle in a cooler maintained at 4°C throughout the sampling and transportation period.

Soils

1. Place clean sample container on clean surface.
2. Place soil into appropriate sample container.
3. For samples contained in a brass tube, cap each end with Teflon tape or aluminum foil and a plastic cap.
4. Place the properly labeled sample container in a cooler maintained at 4°C throughout the sampling and transportation period.

Sample Coordination

Review chain-of-custody and submit samples to laboratory upon return from the field. Alternate arrangements shall be made if sample holding times will expire before fieldwork is completed. Soil samples do not require additional packaging during transport; however, liquid samples should be packaged securely.

DRILLING FOR SUBSURFACE INVESTIGATION AND MONITORING WELL INSTALLATION

Refer to the drilling file for drilling method(s), sampling depth(s), sampling method(s), and monitoring well construction specifications. The drill rig operator shall possess, or work for a company that possesses, a valid, current C-57 Well Driller's License. Installation, construction, and closure of borings and monitoring wells shall be in accordance with Bulletins 74-81 and 74-90, California. Variations from the California Well Standards must be authorized by the Oversight Agency, in advance. Rotary and direct push drilling procedures are discussed. General borehole logging and sample handling procedures are outlined in the General Methodologies Section.

Rotary Drilling

Rotary drilling uses flighted augers to remove soil from a borehole. The purpose is to advance a borehole to a designated depth from which a sampler will be utilized to collect soil or groundwater samples, or install a casing to hold a borehole open. Augers are typically constructed in 5-foot lengths of heavy-duty steel that connect together. Caution is advised when lifting heavy equipment. Hollow stem augers are open in the middle and solid are not. Solid flight augers are generally used in cohesive soils. Non-cohesive soils require the use of hollow stem augers.

Solid Flight Augers

Augers are advanced to the required depth and removed, then a soil sampler or casing is lowered into in the borehole.

Soil Sampling

A soil sampler connected to drill rod(s) is advanced to the specified depth and retrieved. A steel split-spoon or push tube is used to collect soil samples (Figure 1).

1. Lift augers out of borehole and insert clean split-spoon or push tube sampler.
2. The split spoon is attached to heavy-duty drill-rods and the push tube to light weight rods.
3. Lower the assembly into the borehole.
4. Attach a slide hammer to the rods.
5. Without lifting the rods, advance the sampler to the specified depth.
6. Retract the rods to the starting depth and disconnect the slide hammer.
7. Attach a lifting nipple to the rods and retract the sampler.
8. Remove the soil from the sampler in a clean work area.

9. Follow soil sample collection and handling procedures.

Groundwater Sampling

A well screen is installed to the specified depth for the retrieval of groundwater grab samples and recording of depth to water measurements (Figure 2). A bailer or bottom tubing check ball pump is typically used to collect groundwater samples.

Temporary Screening Well Construction

1. Using new clean PVC pipe, saw-cut slots over the desired screen interval (typically 5 feet).
2. Place a cap on each end.
3. With the slotted end down, insert pipe to bottom of borehole.
4. If the boring is to be left overnight, or if it may receive surface runoff, place a bridge to a depth of 1 foot around the pipe followed by a bentonite seal.

Groundwater Collection

1. Slowly lower the specified sampling device to approximately one foot above the bottom of the casing to minimize the amount of sediment collected in the groundwater sample.
2. Follow groundwater sample handling and collection procedures.

Hollow Stem Augers

Hollow Stem Augers are used to prevent a borehole from collapsing during sample collection or well installation. Augers are advanced to the required depth and the drill rods are removed. A soil or hydropunch sampler is then lowered down the hollow augers. When a continuous soil core is desired, a core barrel positioned inside the augers is simultaneously advanced to the specified depth. The augers function as a centralizer during placement of well casing and as a tremmie pipe during the placement of the annular materials.

Soil Sampling

A soil sampler connected to drill rod(s) is lowered through the augers or advanced with the augers to the specified depth and retrieved (Figure 3).

1. Attach a clean push tube or split-spoon to the drill rods.
2. The push tube is attached to light weight rods and the split spoon to heavy-duty drill rods.
3. Lower the assembly into the borehole through the hollow stem augers.
4. Attach a slide hammer to the drill rods.
5. Without lifting the rods, advance the sampler to the specified depth.

6. Retract the rods to the starting depth and disconnect the slide hammer.
7. Attach a lifting nipple to the rods and retract the sampler.
8. In a clean work area remove the soil from the sampler.
9. Follow soil sample handling and collection procedures.

Hydropunch Sampling

A groundwater sampler connected to drill rod(s) is lowered through the augers, advanced to the specified depth and retracted to expose the sampler to the aquifer (Figure 4).

1. Assemble a clean hydropunch sampler with new slotted casing and expendable drive point. Check and replace damaged o-ring seals. Position a gouch tube over the shoe and drive point ensuring the point remains tightly against the shoe.
2. Attach the hydropunch sampler to the drill rods. Teflon tape should be placed on the threads.
3. Lower the assembly into the borehole through the hollow stem augers.
4. Attach the slide hammer to the drive rods.
5. Without lifting the drive rods, advance the assembly to the specified depth.
6. Retract the drive rods to the specified depth to open the sampler, secure the drive rods, and disconnect the slide hammer.
7. Follow groundwater sample handling and collection procedures.
8. Remove the drive rods and hydropunch assembly. The casing and drive point remain in the borehole.

Monitoring Well Installation

Augers are advanced to the required depth and the drill rods are removed. The augers are used to allow proper placement of the well casing and annular materials. Monitoring well construction specifications are outlined in the workplan and drilling file. Well installation can be a tedious process with several potential problems. The licensed well driller ultimately decides how the well installation will proceed.

1. Assemble a new well casing (screen and blank pipe) with a locking cap and end cap.
2. Lower assembly into the borehole through the hollow stem augers.
3. Pour sand inside the augers, according to the licensed well driller's instructions.

4. Once the sand pack is in place, place the annular seal according to the licensed well driller's instructions.
5. Complete the well by setting an access box in a concrete apron.
6. Tag or label the well with the number.

Direct Push

Direct push uses a pneumatic hammer and hydraulic piston to advance soil and groundwater samplers or hollow drive rods to hold the borehole open during monitoring well installation. Rods are constructed in 5-foot lengths of heavy-duty steel that connect together. Caution is advised when lifting heavy rods.

Soil Sampling (Macrocore)

A piston rod soil sampler (Macrocore) connected to the lead drive rod is advanced to the specified depth, the piston rod is removed, and the sampler is advanced to the appropriate depth and retrieved (Figure 6).

Sampler Assembly, Advancement, and Sample Collection

1. Assemble a clean Macrocore as specified. Check and replace damaged O-ring seals.
2. Attach the Macrocore to the drive rods.
3. Advance the Macrocore to the specified depth.
4. Remove the piston rod.
5. Advance the Macrocore through the desired sampling interval (4 feet or less).
6. Retract the sampler.
7. In a clean work area remove the core from the sampler.
8. Cut open the plastic liner.
9. Follow soil sample handling and collection procedures.

Groundwater Sampling (Screen Point Sampler)

A screen-point sampler connected to drive rod(s) is advanced to the specified depth (Figure 7). The sheath is retracted to expose the screen and a bottom tubing check ball pump or peristaltic pump is used to collect groundwater samples.

Screen Point Sampler Assembly and Advancement

1. Assemble a clean screen point sampler with new expendable drive point. Check and replace damaged O-ring seals.
2. Attach the sampler to the drive rods with new O-rings placed on the top of each rod.
3. Advance the sampler to the specified depth.

4. Retract the drive rods to expose the screen (4 feet or less).

Groundwater Collection

1. Slowly lower the specified sampling device to the bottom of the screen point sampler.
2. Follow groundwater sample handling and collection procedures.
3. Remove the drill rods and sampler assembly.
4. The drive point remains in the borehole.

Monitoring Well Installation

3.25-inch diameter hollow drive rods are advanced to the required depth with an expendable tip. The hollow rods are used to allow proper placement of the well casing and annular materials. Monitoring well installation specifications are outlined in the workplan and drilling file. Well installation can be a tenuous process with several potential problems. The licensed well driller ultimately decides how the well construction will proceed.

1. Assemble a new well casing (screen and blank pipe) with a locking cap and end cap.
2. Lower assembly into the drive rods.
3. Pour sand inside the rods, according to the licensed well driller's instructions.
4. Once the sand pack is in place, place the annular seal according to the licensed well driller's instructions.
5. Complete the well by setting an access box in a concrete apron.
6. Tag or label the well with the number.

Hand Auger

A hand auger uses an auger bucket and connecting rods to remove soil from a borehole for the purpose for advancing a boring to a sampling depth. A sampler is then used to collect soil samples or a casing is installed to hold the borehole open. 1-inch diameter monitoring wells can also be installed. Buckets are typically one foot long. Connecting rods are typically constructed in 4-foot lengths of steel. A hand auger is used when drill rig access is limited, utilities are too close, or the total depth is generally less than 5 feet.

Soil Sampling

A steel push tube is used to collect soil samples (Figure 9). The sampler is connected to drive rod(s) and is advanced to the specified depth using a slide hammer. Sampler is

retrieved by hammering in the opposite direction. Refer to soil sample collection and handling procedures.

Groundwater Sampling

A slotted casing is installed to the specified depth for the retrieval of groundwater grab samples and recording of depth-to-water measurements (Figure 10). A bailer or peristaltic pump is typically used to collect groundwater samples. Refer to groundwater sample collection and handling procedures.

Monitoring Well Construction

Auger the borehole to the required depth (Figure 11). Monitoring well construction specifications are outlined in the workplan and drilling file.

1. Assemble a new well casing (screen and blank pipe) with a locking cap and end cap.
2. Lower assembly into the borehole.
3. Pour sand and place the annular seal according to the well driller's instructions.
4. Complete the well by setting an access box in a concrete apron.
5. Tag or label the well with the number.

MONITORING WELL DEVELOPMENT AND SURVEYING

Monitoring Well Development

Following installation of a monitoring well it must be developed before it is brought into service. Developing a well removes sediment in the sand pack and on the borehole wall, and maximizes recharge to the well. Monitoring wells are to be developed prior to setting the seal or a minimum of 72 hours after setting the seal, according to procedures generally described in 40 CFR 264.175.

1. Measure and record total depth of boring and depth-to-water for each well to be developed. Depth-to-water will be measured with an electronic depth sensor or engineers tape (0.01-foot increments) and water sensitive paste. Measurements will be recorded to the nearest 0.01-foot from the top of casing (TOC).
2. Develop wells by slowly inserting and withdrawing an appropriately sized surge block through the entire water column without rising above the water surface. This is *surging* the wells.
3. After 5 minutes quickly remove the surge block and insert a submersible pump with the intake no less than 2 feet off the bottom. If well diameter is too small for a submersible pump, a bailer should be used.
4. Purge water from the well at a rate of 1 to 2 gallons per minute [gpm], until clarity is reached. This is *purging* the well. Surging and purging may be repeated as necessary, but should be progressively gentler.
5. Complete a monitoring well field worksheet (Attachment 5).
6. A newly developed well is to be sampled no sooner than 24 hours after development. Refer to SOP No. 2 for monitoring well sampling procedures.

Wellhead Surveying

The reference elevation with respect to NAVD-88 for the top of casing (TOC) for each monitoring well or temporary screening well will be determined by survey to the nearest 0.01 foot. Surveys are to be performed under the supervision of a licensed land surveyor with the appropriate equipment and operated and calibrated in accordance with the manufacturer's recommended procedures. In all cases, wells shall be located horizontally under the supervision of a licensed land surveyor to the State Plane Coordinate System.

REFERENCES

ASTM D-2488
40 CFR 264.175
California Well Standards Bulletin 74-81
California Well Standards Bulletin 74-90

LIST OF FIGURES

- Figure 1 Soil Sampling with Solid Flight Augers
- Figure 2 Groundwater Sampling with Solid Flight Augers
- Figure 3 Soil Sampling with Hollow-Stem Rotary Augers
- Figure 4 Hydropunch Sampling with Hollow-Stem Rotary Augers
- Figure 5 Monitoring Well Construction with Hollow-Stem Rotary Augers
- Figure 6 Direct-Push Soil Sampling with Macrocores
- Figure 7 Direct-Push Depth-Discrete Groundwater Sampling
- Figure 8 Direct-Push Monitoring Well Construction
- Figure 9 Hand-Auger Soil Sampling
- Figure 10 Hand-Auger Groundwater Sampling
- Figure 11 Hand-Auger Monitoring Well Construction

LIST OF ATTACHMENTS

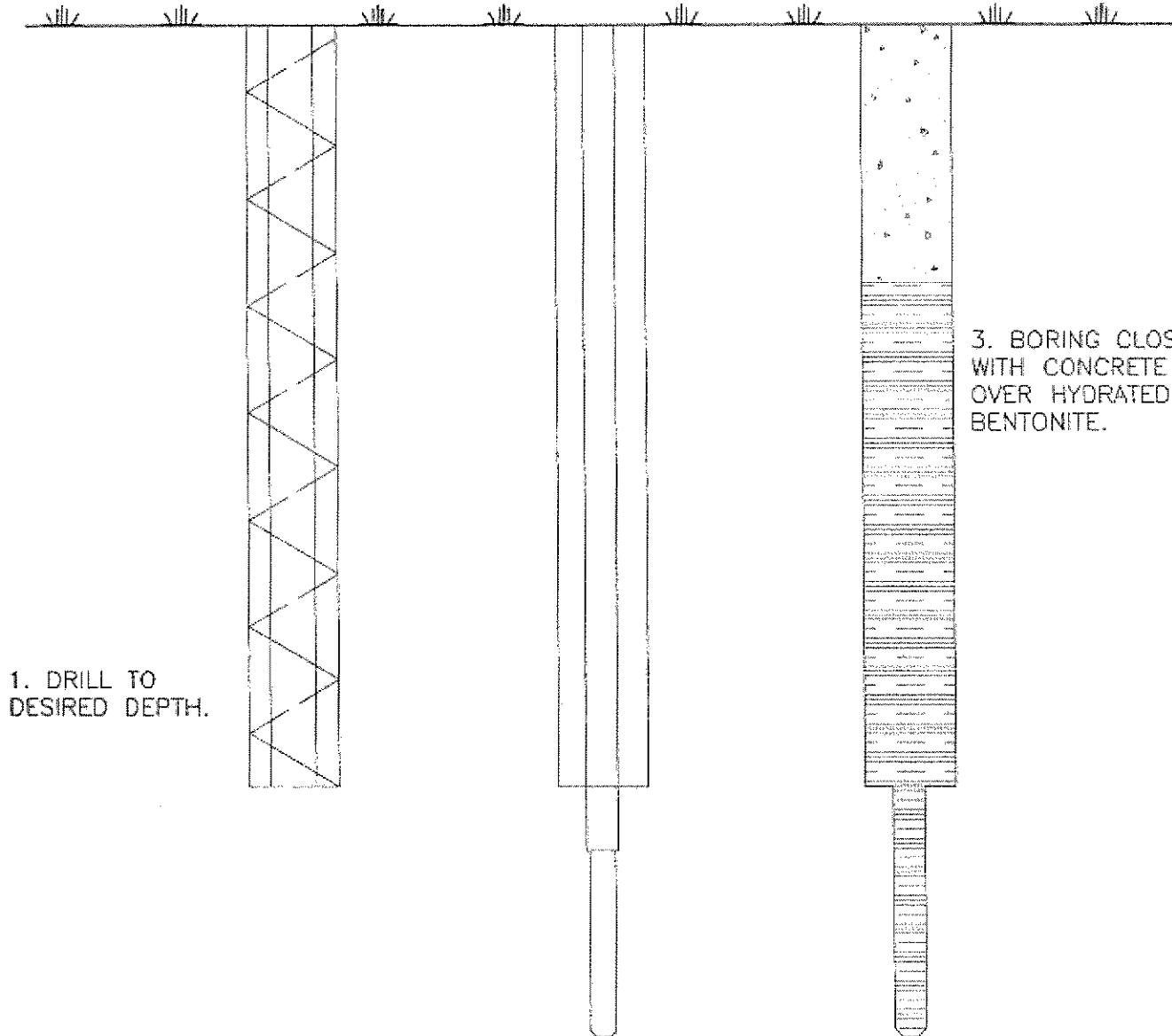
- Attachment 1 Drilling File Checklist
- Attachment 2 Field Safety Meeting Form
- Attachment 3 Soil Boring Log
- Attachment 4 Chain of Custody
- Attachment 5 Monitoring Well Sampling Field Form

FIGURES



LACO ASSOCIATES
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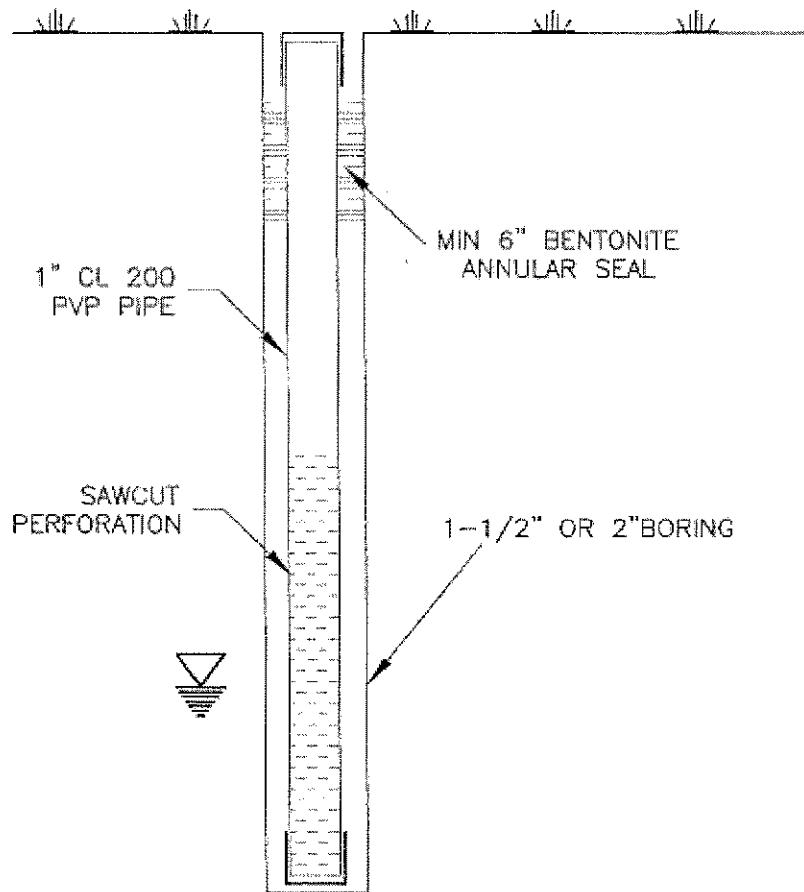
PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE	1
CLIENT		DATE	8/21/02		
LOCATION		CHECK		JOB NO.	
	TYPICAL SOLID FLIGHT AUGER SOIL SAMPLING	SCALE	NTS		





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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE 2
CLIENT		DATE	8/21/02	
LOCATION		CHECK		JOB NO.
	TYPICAL SOLID FLIGHT AUGER GROUNDWATER SAMPLING	SCALE	NTS	



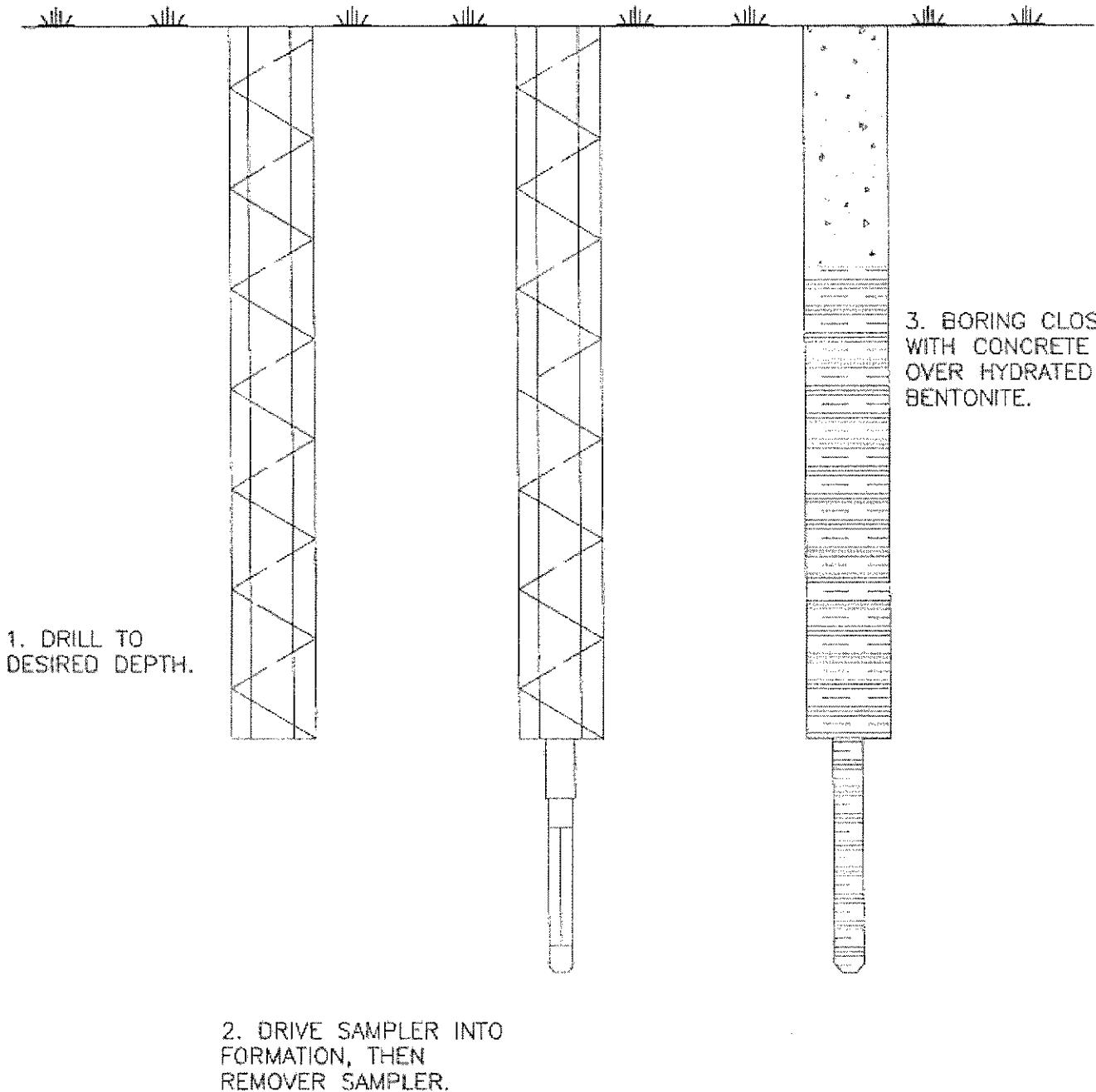
A. SCREENING WELL (NO WELLPOINT)

USED IN AREAS FREE OF SURFACE
CONTAMINATION OR OTHER CONTAMINATION
NOT CURRENTLY IN CONTACT WITH
GROUNDWATER CLOSED WITHIN 72 HOURS.



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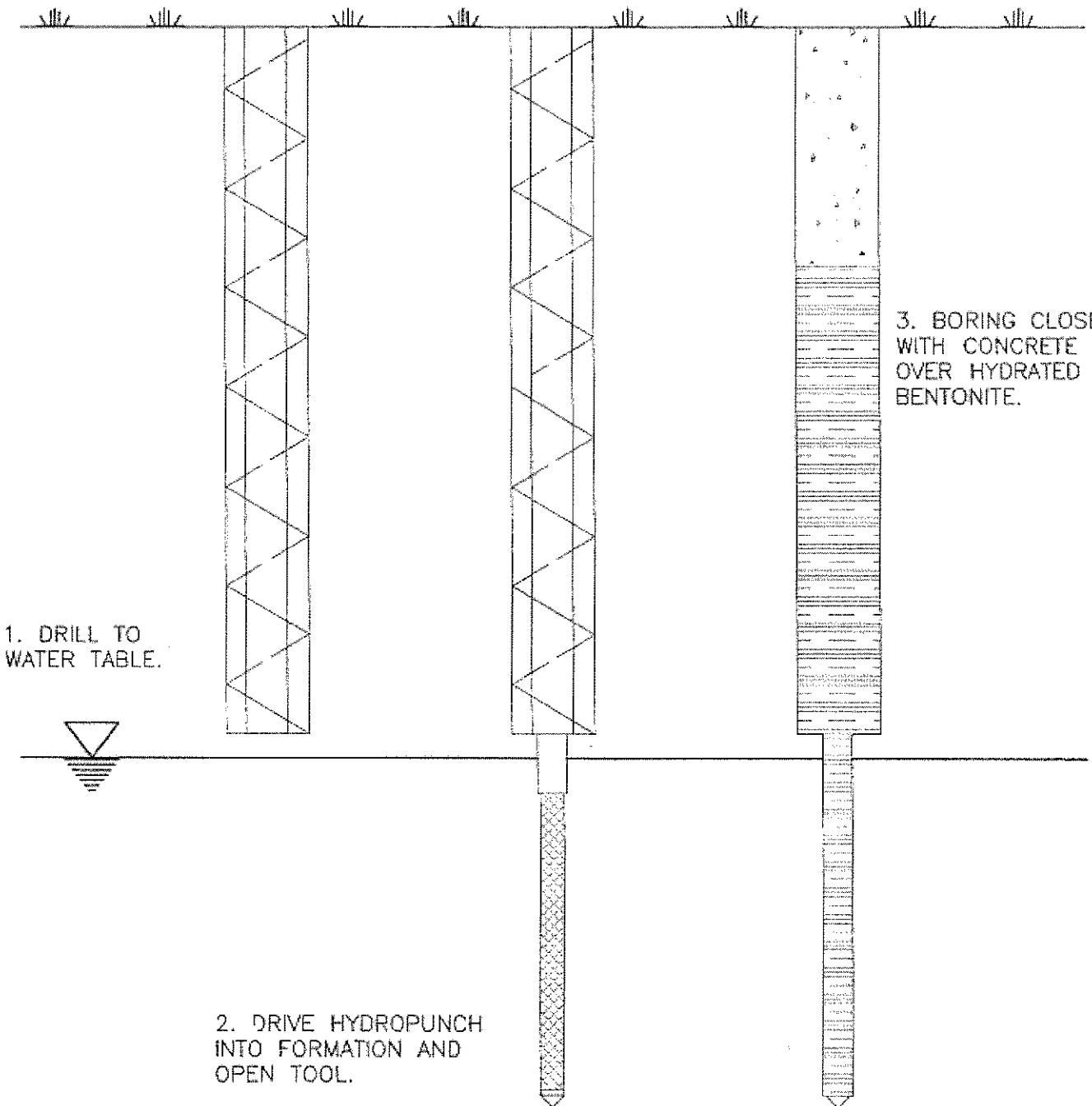
PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT		DATE	8/21/02	3
LOCATION		CHECK		JOB NO.
TYPICAL HOLLOW STEM AUGER SOIL SAMPLING	SCALE	NTS		





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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT		DATE	8/21/02	4
LOCATION		CHECK		JOE NO.
	TYPICAL HYDROPUCH BORING	SCALE	NTS	





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STANDARD OPERATING PROCEDURES

BY BAB

PAGE 5

PROJECT

CLIENT

LOCATION

DATE 8/19/02

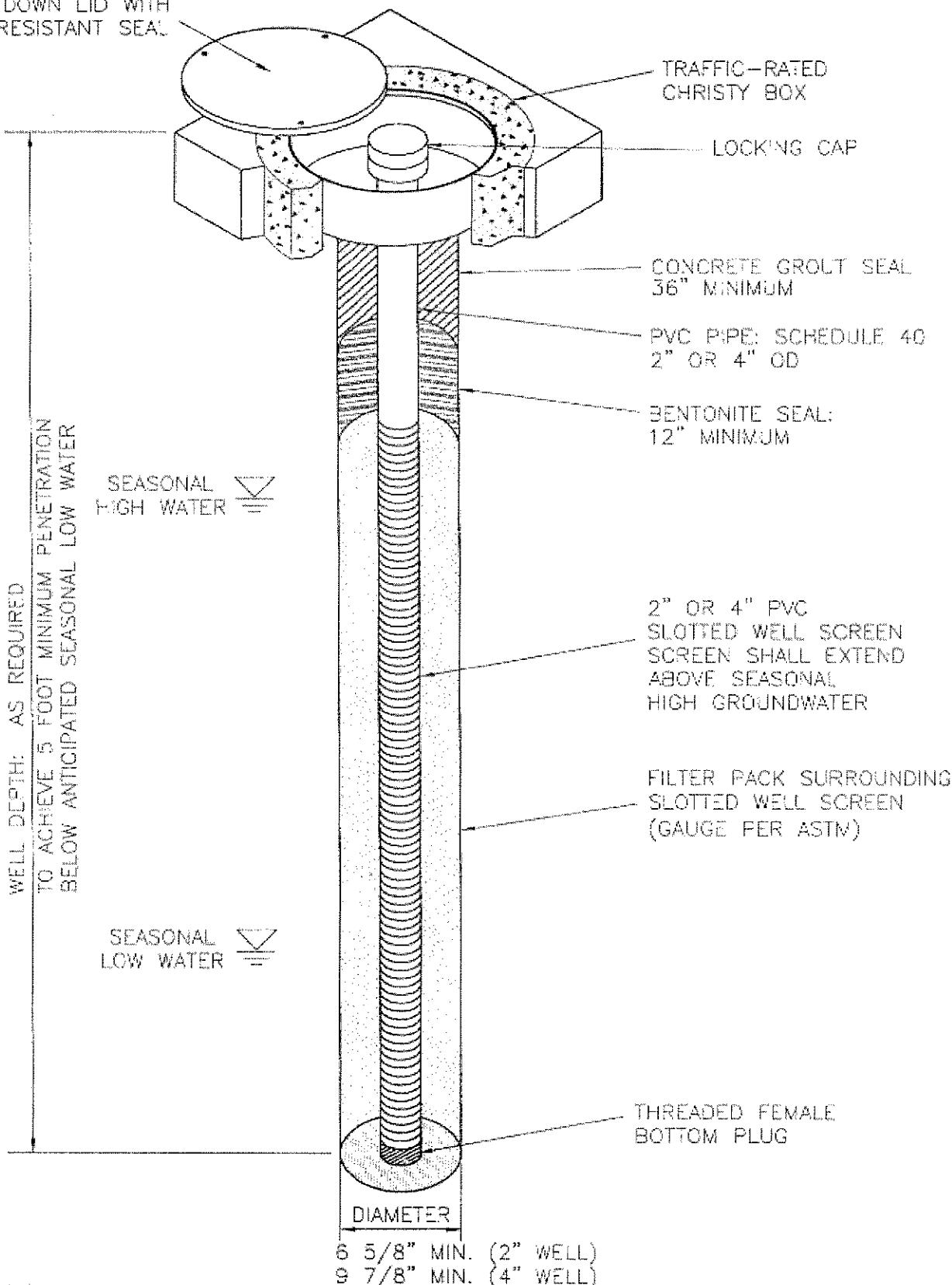
CHECK

JOB NO.

TYPICAL MONITORING WELL

SCALE NTS

BOLT DOWN LID WITH
WATER RESISTANT SEAL



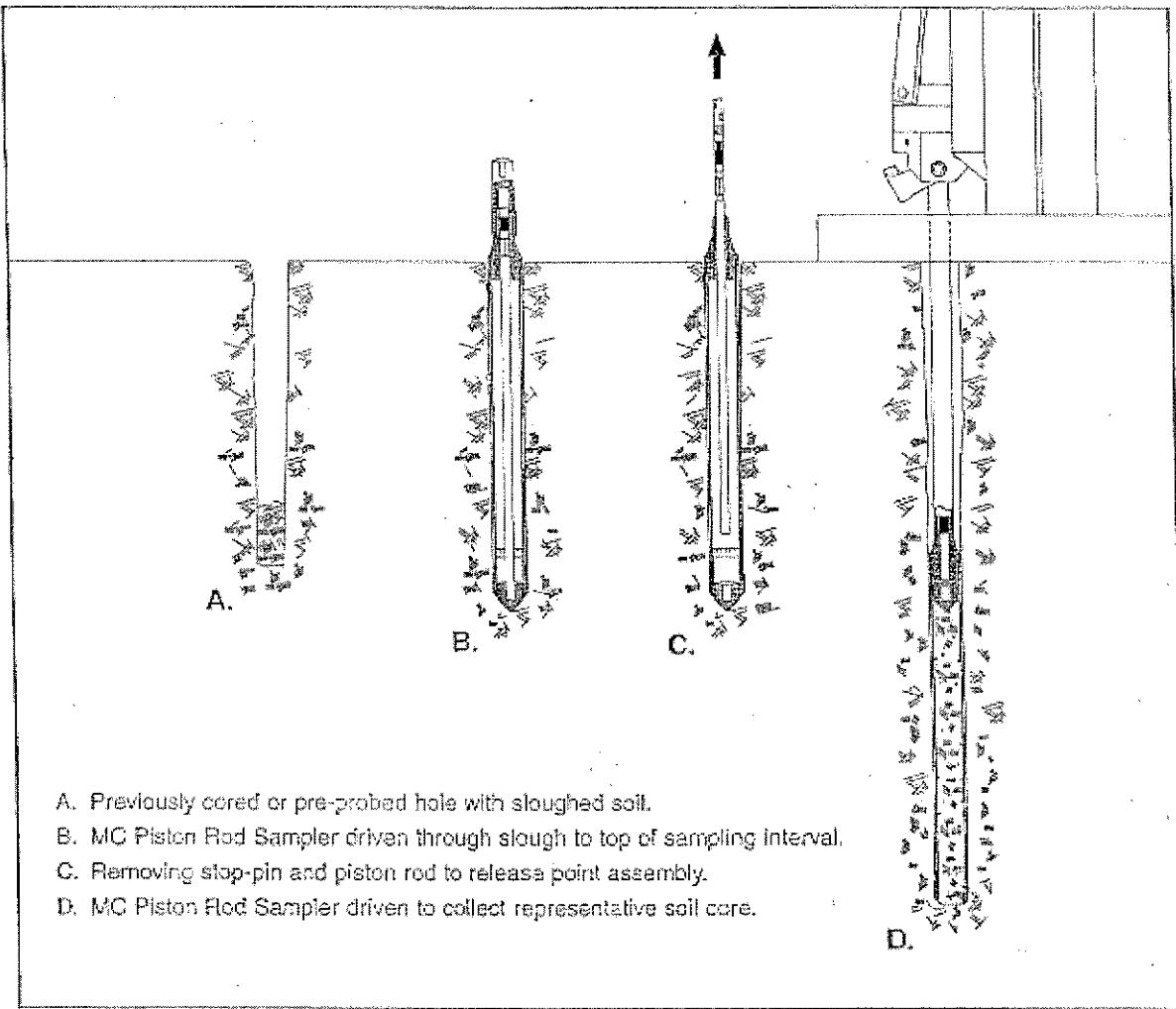


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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE 6
CLIENT		DATE	8/21/02	
LOCATION			CHECK	JOB NO.
	PISTON ROD SOIL SAMPLING		SCALE NTS	

GEOPROBE MACRO-CORE® SOIL SAMPLER



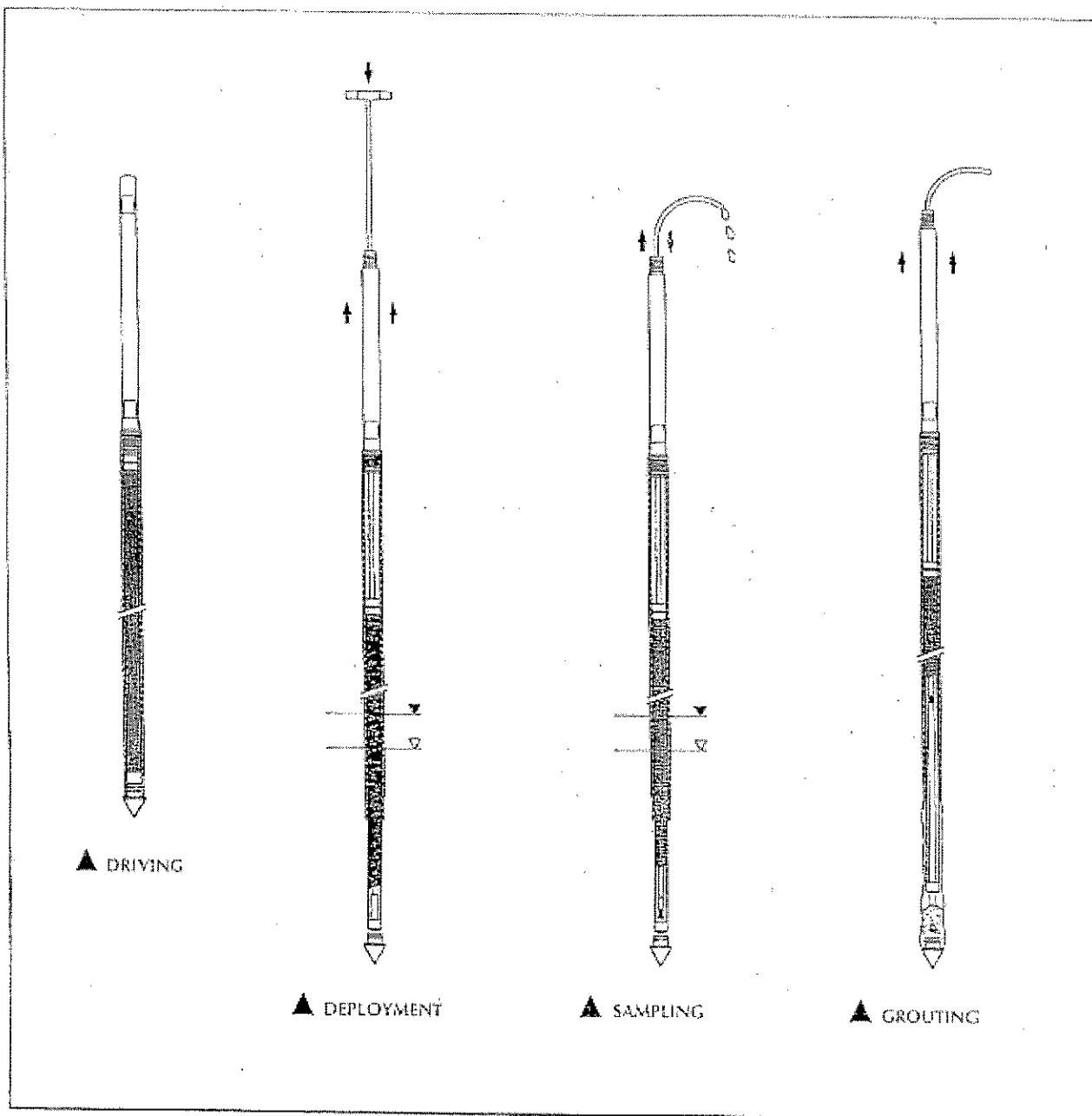


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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT		DATE	8/21/02	7
LOCATION		CHECK		JOB NO.
	GROUNDWATER SAMPLING	SCALE	NTS	

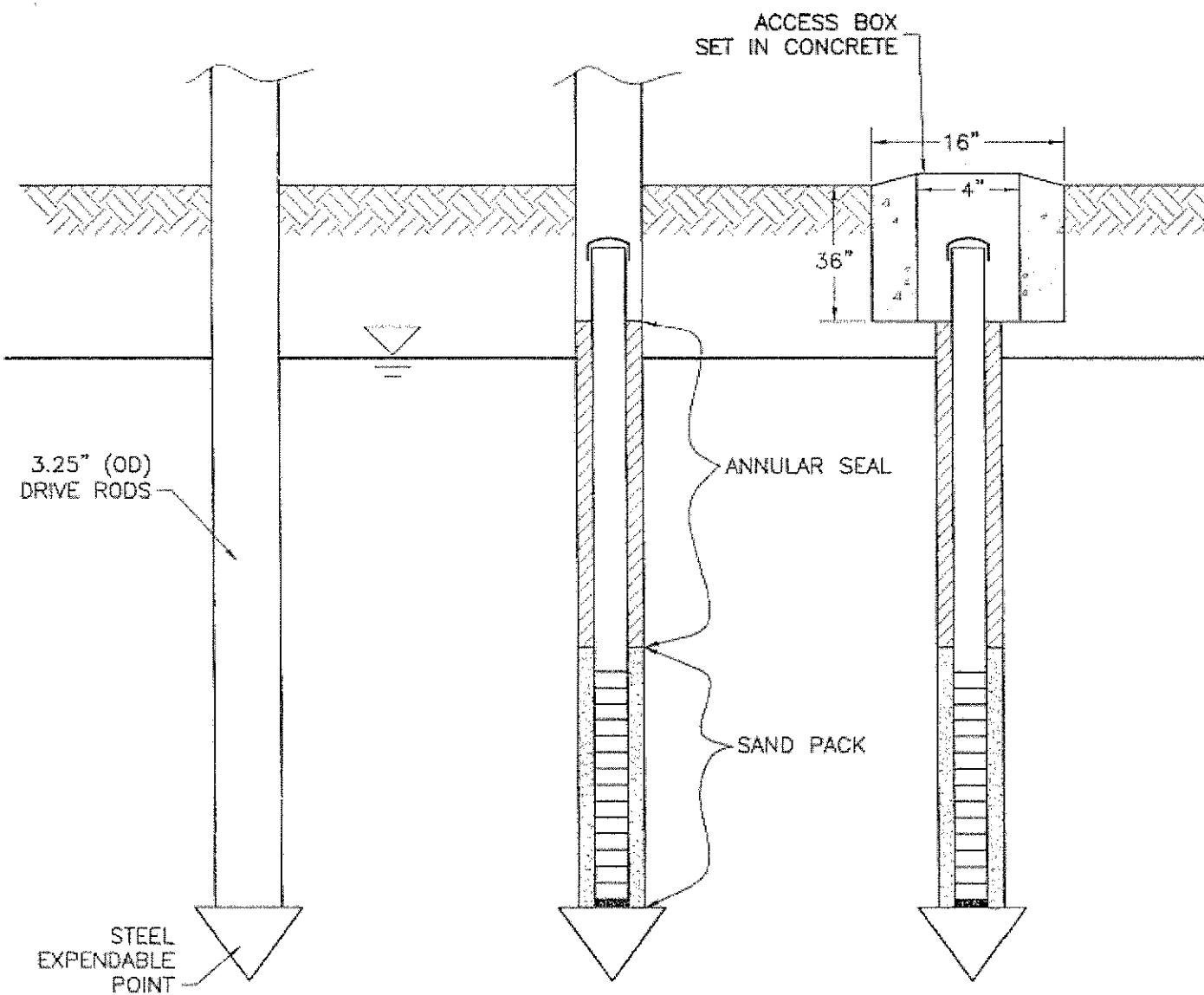
GEOPROBE® SCREEN POINT 16 GROUNDWATER SAMPLERS





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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT			5/28/02	8
LOCATION		CHECK		JOB NO.
DIRECT PUSH MONITORING WELL			SCALE NTS	



1. DRIVE SEALED
DUAL TUBE TO
TOTAL DEPTH

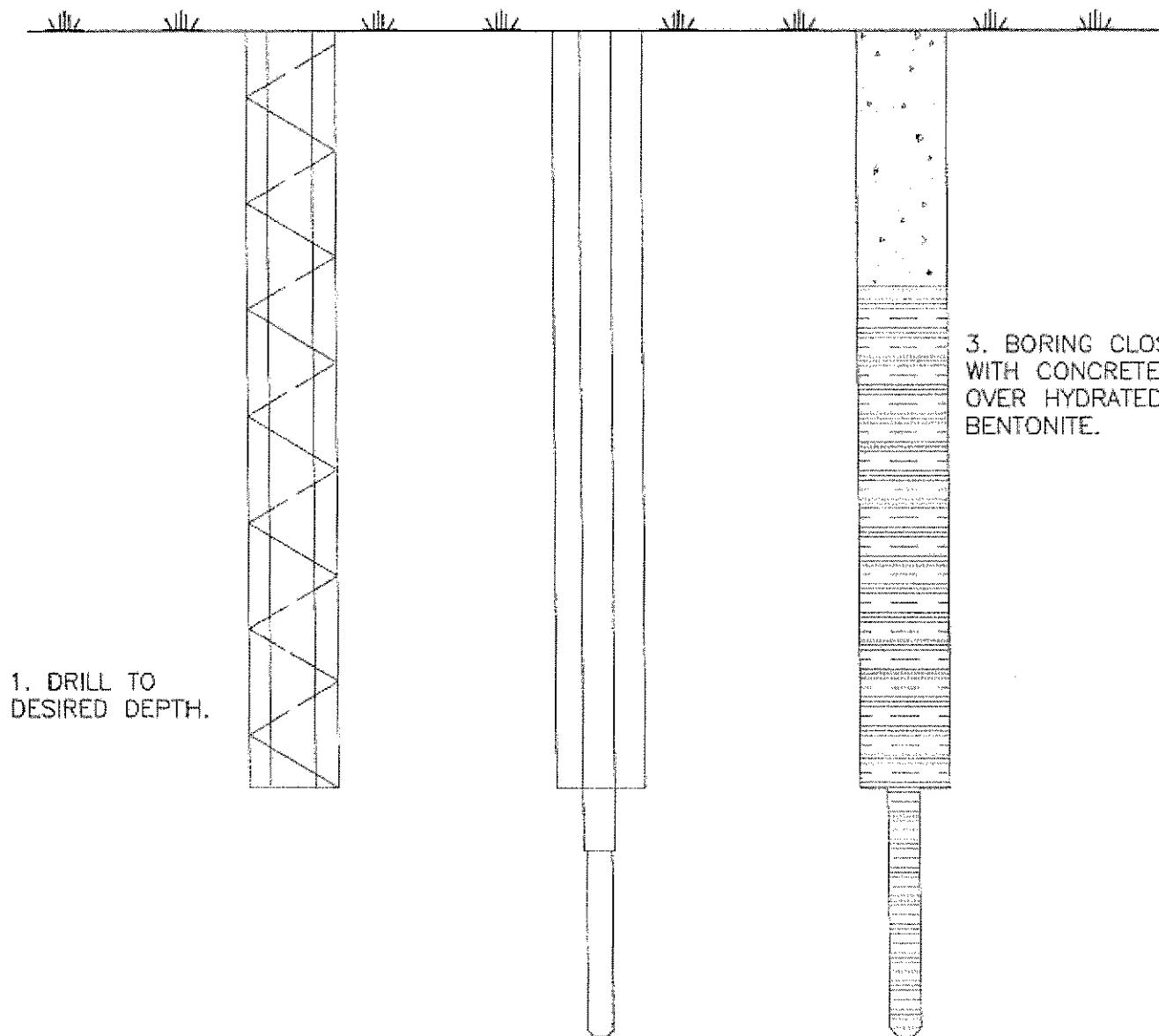
2. SET 1.5" PVC
SCREEN & BLANK PIPE
& ANNULAR MATERIALS,
EXTRACT RODS

3. SET ACCESS BOX
IN CONCRETE 36"x16"



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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE 9
CUSTOMER		DATE	8/21/02	
LOCATION		CHECK		
TYPICAL HAND AUGER SOIL SAMPLING		SCALE	NTS	

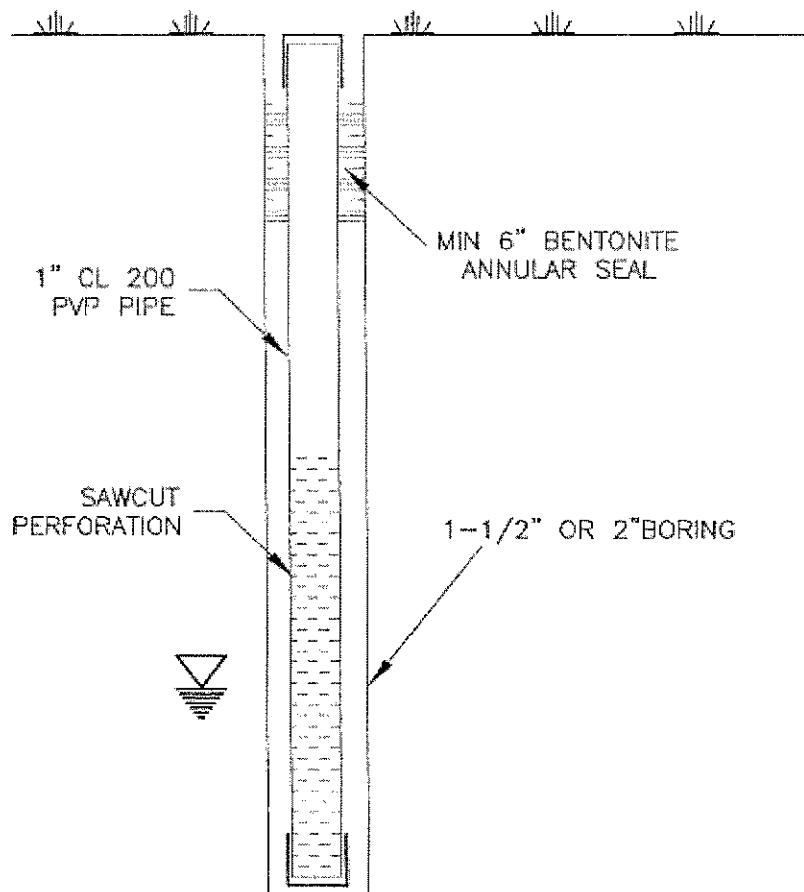


2. REMOVE AUGER AND
DRIVE SAMPLER INTO
FORMATION, THEN
REMOVE SAMPLER.



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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT		DATE	8/21/02	10
LOCATION		CHECK		JOB NO.
TYPICAL HAND AUGER GROUNDWATER SAMPLING	SCALE	NTS		



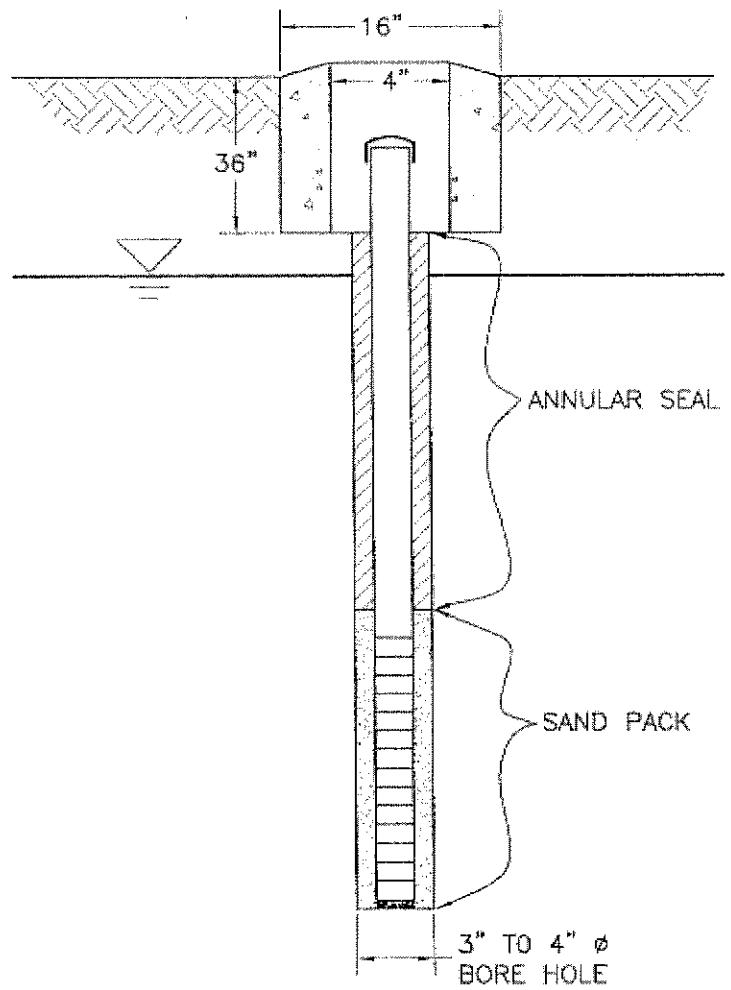
A. SCREENING WELL (NO WELLPOINT)

USED IN AREAS FREE OF SURFACE
CONTAMINATION OR OTHER CONTAMINATION
NOT CURRENTLY IN CONTACT WITH
GROUNDWATER CLOSED WITHIN 72 HOURS.



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PROJECT	STANDARD OPERATING PROCEDURES	BY	BAB	FIGURE
CLIENT		DATE	8/21/02	11
LOCATION		CHECK		JOB NO.
	TYPICAL HAND AUGER MONITORING WELL	SCALE	NTS	



1. HAND AUGER TO
DESIRED DEPTH

2. SET 1" TO 1.5" PVC
SCREEN & BLANK PIPE
& ANNULAR MATERIALS.

3. SET ACCESS BOX
IN CONCRETE 36"x16"

ATTACHMENTS

Project Name _____
Project Manager _____

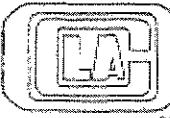
Project Number _____
Date initiated _____

<u>Task</u>	<u>Initials</u>	<u>Date</u>	<u>Due Date</u>
Project Manager (PM)			
40	_____	_____	<input type="checkbox"/> Project initiation, <i>PM obtains blank drilling file from Drilling Coordinator (DC) (15 to 30 days prior to drilling day)</i>
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Work Plan reviewed by PM
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Addenda (where appropriate) reviewed by PM
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Regulatory approval letter reviewed by PM
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Fund pre approval documents (where appropriate) reviewed by PM
40	_____	_____	<input type="checkbox"/> Contact Drilling company for tentative start date (if other than Lake's Well Drilling)
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Initial Preferred field personnel, tentative start work date, budget, order of work (Drilling File Form-1) created by PM
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Initial preferred field personnel approval, approved by Vice President of Operations (VPO)
40	_____	_____	<input type="checkbox"/> Site Map obtained by PM with locations of existing and proposed holes indicated
40	_____	_____	<input type="checkbox"/> Site Safety Plan obtained by PM
40	_____	_____	<input type="checkbox"/> PM forwards drilling file to DC
Permitting Team			
53	_____	_____	<input type="checkbox"/> Drilling permit request, DC reviews file (8 to 20) days prior to drilling day
53	_____	_____	<input type="checkbox"/> DC forwards drilling file to DC assistant
53	copy to file	copy to file	<input type="checkbox"/> DC Assistant obtains the following forms, submits a copy to the drilling file and once original is returned, submits it to the drilling file.
51	copy to file	copy to file	<input type="checkbox"/> Private property access agreement
51	copy to file	copy to file	<input type="checkbox"/> Encroachment permit
33	copy to file	copy to file	<input type="checkbox"/> Drilling permit application
33	copy to file	copy to file	<input type="checkbox"/> Site Clearances, (Drilling File Form-2), site clearance information gathered by DC assistant
33	copy to file	copy to file	<input type="checkbox"/> Parcel Map and list of property owners, (if applicable)
33	copy to file	copy to file	<input type="checkbox"/> <input checked="" type="checkbox"/> USA marks, DC defines USA area on map
33	copy to file	copy to file	<input type="checkbox"/> Drilling file review, reviewed by DC and forwarded to PM
Project Manager			
40	_____	_____	<input type="checkbox"/> Drilling file review for completeness, reviewed by PM, (5 to 10 days prior to drilling day)
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Final field personnel request, (Drilling File Form-3) created by PM
40	_____	_____	<input type="checkbox"/> <input checked="" type="checkbox"/> Final personnel approval, approved by VPO (See Drilling File Form-3)
Geologist (5 to 10 days prior to drilling day)			
40	_____	_____	<input type="checkbox"/> Drilling file review, reviewed by Geologist
40	_____	_____	<input type="checkbox"/> Meeting-discuss tasks not clearly defined and background information, Geologist meets with PM
40	_____	_____	<input type="checkbox"/> Meeting-reconfirmation start date and personnel, Geologist schedules meeting with DC, PM, VPO

Project Name _____
Project Manager _____

Project Number _____
Date initiated _____

<u>Task</u>	<u>Initials</u>	<u>Date</u>	<u>Due Date</u>
Geologist continued (5 to 10 days prior to drilling day)			
51		<input type="checkbox"/> <input checked="" type="checkbox"/> Notification of work schedule, <i>Geologist personally notifies by phone and documents, (See Drilling File Form-2)</i>	
51		<input type="checkbox"/> <input checked="" type="checkbox"/> Owners	
51		<input type="checkbox"/> <input checked="" type="checkbox"/> Tenants	
51		<input type="checkbox"/> <input checked="" type="checkbox"/> Private Property Owners	
51		<input type="checkbox"/> <input checked="" type="checkbox"/> Public Agencies	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Well hardware Est, (Drilling File Form-4), <i>created by Geologist, given to DC</i>	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Well hardware ordered, (See Drilling File Form-4) <i>ordered by DC and form returned to Geologist</i>	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Laboratory container order, <i>ordered by DC</i>	
33		<input type="checkbox"/> <input checked="" type="checkbox"/> Schedule of Site Markings, <i>Geologist arranges for site to be USA marked by field tech</i>	
33		<input type="checkbox"/> <input checked="" type="checkbox"/> Site Markings, Field tech marks site, signs and dates site map, submits to PM and geologist (5 days prior to drilling day)	
33		<input type="checkbox"/> Meeting-DC meets with Geologist to discuss USA description of work area	
Project Manager (5 days prior to drilling day)			
33		<input type="checkbox"/> <input checked="" type="checkbox"/> USA contact and #, PM calls in ticket and records start work date and time, ticket # and renewal date (5 days prior to drilling) (See Drilling File Form-2)	
48		<input type="checkbox"/> <input checked="" type="checkbox"/> Regulatory agency contact, PM calls regulatory agency with confirmed start date (1 to 2 days prior to drilling day) (See Drilling File Form-2)	
Project Manager (1 day prior to drilling day)			
40		<input type="checkbox"/> Drilling file review, reviewed by PM	
Drilling Starts (Follow SOP #1)			
Geologist			
40		<input type="checkbox"/> Field Notes, <i>collected by Geologist(3 days after drilling)</i>	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Boring and well construction logs	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Field notes and drawings	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Equipment and supply billing forms	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Chain of Custody for analytical lab samples	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Written summary of work performed	
40		<input type="checkbox"/> <input checked="" type="checkbox"/> Completed site safety form, submit copy to LACO safety officer, (See Drilling File Form-5)	
Project Manager			
40		<input type="checkbox"/> Drilling file review, PM reviews file and distributes appropriate information (5 days after drilling)	



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21 W 4TH STREET EUREKA, CA 95501

FIELD SAFETY MEETING

Complete and return to LACO Safety Officer

PROJECT NAME / NUMBER: _____ DATE: _____

MEETING HELD BY: _____ (Field Supervisor)

PERSONS ATTENDING: _____

HAZARDS NOTED & DISCUSSED: _____

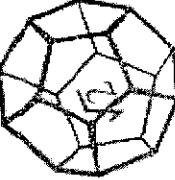
- Slip, Trip Fall; _____
- Personal Protective Equipment; _____
- Public Safety Protection; _____
- Hazardous Materials; _____
- Emergency Action Plan; _____

ATTENDEES SIGNATURES: _____



21 West Fourth Street, Eureka, CA 95501
TEL 707.443.5554
FAX 707.443.0553

NORTH COAST LABORATORIES LTD.



5630 West End Road • Arcata • CA 95521-9302
707-823-4649 Fax 707-822-6883

Chain of Custody

Attention: _____		Results & Invoice to: _____		Address: _____		TELEPHONE: _____		FAX: _____		E-MAIL: _____	
PROJECT INFORMATION											
Project Number: _____		Project Name: _____		Purchase Order Number: _____		SAMPLE ID: _____		DATE: _____		TIME: _____	
ANALYSIS											
SAMPLE CONDITION/SPECIAL INSTRUCTIONS											
TAT: <input type="checkbox"/> 24 Hr <input type="checkbox"/> 48 Hr <input type="checkbox"/> 5 Day <input type="checkbox"/> 5-7 Day		STD (2-3 Wk) <input type="checkbox"/> Other: _____		PKCK AUTHORIZATION IS REQUIRED FOR RUSHES		REPORTING REQUIREMENTS: State Forms <input type="checkbox"/>		Preliminary: FAX <input type="checkbox"/> Verbal <input type="checkbox"/> BY: _____		Final Report: FAX <input type="checkbox"/> Verbal <input type="checkbox"/> BY: _____	
CONTAINER CODES: 1— $\frac{1}{2}$ gal. pt; 2—250 ml pt; 3—500 ml pt; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—1 L rg; 9—40 ml VOA; 10—120 ml VON; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other											
PRESERVATIVE CODES: a—HNO ₃ ; b—HCl; c—H ₂ SO ₄ ; d—Na ₂ S ₂ O ₃ ; e—NaOH; f—C ₂ H ₅ OH; g—other											
SAMPLE DISPOSAL		DATE/TIME		RECEIVED BY (Sign)		DATE/TIME		RECEIVED BY (Sign)		DATE/TIME	
<input type="checkbox"/> NCL Disposal of Non-Contaminated		<input type="checkbox"/> Return		<input type="checkbox"/> Pickup		<input type="checkbox"/> UPS		<input type="checkbox"/> Air-Ex		<input type="checkbox"/> Fed-Ex	
<input type="checkbox"/> Bus		<input type="checkbox"/> Hand									
CHAIN OF CUSTODY SEALS Y/N/NA											
SHIPPED VIA:											

*MATRIX: DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUOUS SAMPLES WILL BE RETURNED TO CLIENT



Project Name:		Tech:	
Project No.:		Mob/Demob time:	
Date:		Travel time:	
Global ID No.:		Time on site:	
PM:		Time off site:	
		Mileage:	
FIELD WORKS/SAMPLES	WELL No.	INITIAL	FINAL
	DIAMETER (in)	INITIAL	FINAL
	TYPE	INITIAL	FINAL
	DEPTH 1 (ft)	INITIAL	FINAL
	DEPTH 12 (ft)	INITIAL	FINAL
	DEPTH 8 (ft)	INITIAL	FINAL
	REAS (puncts)	INITIAL	FINAL
	DEP (cm)	INITIAL	FINAL
	DC (infl.)	INITIAL	FINAL
	OTHER (units)	INITIAL	FINAL
TESTS	TYPE	INITIAL	FINAL
	METHOD (CHOOSE ONE)	INITIAL	FINAL
	RATE (cm ³ /min)	INITIAL	FINAL
	VOLUME (ml)	INITIAL	FINAL
	COLOR	INITIAL	FINAL
	ODOR	INITIAL	FINAL
	REMARKS	INITIAL	FINAL
	TYPE	INITIAL	FINAL
	METHOD (CHOOSE ONE)	INITIAL	FINAL
	ANALYSIS	INITIAL	FINAL
REMARKS	INITIAL	FINAL	

SH=DOWN HOLE PUMP CB=CHECK BOTTLE SB=SALEER FB=FIELD DUPLICATE MB=METHOD BLANK FF=FIELD FILTERED

Attachment 2

HAZARDOUS WASTE SAFETY TRAINING AND MEDICAL MONITORING

Employees and subcontractors assigned to the project will have completed a 40-hour OSHA/EPA Hazardous Waste Site Investigation Health and Safety training course. Each employee and subcontractor will complete an annual 8-hour refresher course. Supervisors will have completed an additional supervisor's training course.

Each LACO employee performing work at the site will be responsible for complying with the procedures described in this Site Safety Plan and the LACO Illness and Injury Prevention Program. The Project Manager or Safety Officer may visit the site during the field investigation to evaluate the effectiveness of the program.

LACO personnel training and health surveillance data is listed below (verification available at company office):

Name	Potential Project Role	Init. OSHA Training	Ann. Refrsh. Training	Annual Medical/Respirator Cert.
David N. Lindberg	Principal/CEG	11/08/90	03/04	6/04
David R. Gervan	Principal/PE	11/22/91	12/04	6/04
Frank R. Bickner	Principal/PG	11/08/90	12/04	6/04
Gary L. Manhart	Sr. Geologist/PG	11/10/95	12/04	6/04
Giovanni A Vadurro	Sr. Geologist/PG	07/02/99	03/05	6/04
Dale L. Romanini	Engineering Tech.	11/16/99	12/04	6/04
Christopher J. Watt	Sr. Geologist/PG	08/21/98	12/04	6/04
Timothy D. Nelson	Geologist/PG	03/07/97	12/04	6/04
Christine S. Manhart	Sr. Geologist/PG	04/13/01	12/04	6/04
Wilson J. Martinez	Engineering Aide	06/21/02	12/04	6/04
Jason P. Buck	Staff Geologist	11/20/02	12/04	6/04
Brian Nelson	Field Technician	06/13/03	12/04	6/04
Vincent T. Sullivan	Staff Engineer	02/09/04	-----	2/04
John M. Wellik	Staff Geologist	02/09/04	-----	2/04
Jamison Short	Field Technician	02/09/04	-----	2/04
Dennis Lake	Driller	01/07/91	12/04	-----
Steven Davis	Field Technician	02/15/05	-----	2/04
Mike Kitahara	Environmental Scientist	03/11/05	-----	4/05
Brian Hodgson	Staff Engineer	03/11/05	-----	3/05
Gwen Erickson	Staff Geologist	06/21/02	06/03	05/05
Caroline Levenda	Staff Geologist	04/10/03	03/05	03/05